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CONTENTS

MEDICAL ARTICLES

Review of the Effects of Sleep Deprivation	1
Experience in Submarine Psychiatry	4
Silent Myocardial Infarction	9
Cutaneous Lipomas and Lipomatosis	11
Serum Immunoglobulin Levels in Blood Donors Implicated in Transmission of Hepatitis	13

MEDICAL ABSTRACTS

Bone Abnormalities in Gardner's Syndrome	16
Zollinger-Ellison Syndrome	16
Calcitonin (Thyrocalcitonin)	16
Treatment of Thyrotoxicosis	17
Course of Dermatomyositis-Polymyositis	17

DENTAL SECTION

Chilled Silver Cone as a Root Canal Filling Material	17
---	----

DENTAL SECTION (Con.)

Effect of Time of Extraction on Resolution of Odontogenic Cellulitis	18
Personnel and Professional Notes	18

NURSE CORPS SECTION

Role and Function of Bedside Nursing for the Future	19
--	----

OCCUPATIONAL MEDICINE SECTION

Asbestos Hazards in Naval Dockyards	21
Evolution of Concepts Concerning Etiology and Pathogenesis of Cancer	25
"KP" Dermatitis	26

EDITOR'S SECTION

A New Device for Knee Arthrograms	27
NSHA Change of Command	28
Awards and Honors	29

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United States Navy
MEDICAL NEWS LETTER

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Friday, 22 November 1968

No. 10

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Policy

The U.S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, sus-

ceptible to use by any officer as a substitute for any item or article, in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to Editor: Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C. 20390 (Code 18), giving full name, rank, corps, old and new addresses, and zip code.

FRONT COVER: U.S. NAVAL HOSPITAL, NAPLES, ITALY. The former Station Hospital at Naples, Italy was reclassified as a U.S. Naval Hospital and commissioned as such 1 July 1968. This is a BUMED command and support activity under the area coordination of the Commander, Fleet Air Mediterranean. The hospital provides inpatient and outpatient care to the Naval Support Activity at Naples and to other personnel attached to over 50 American military activities in the southern European Mediterranean area. Half the medical workload is generated by the Sixth Fleet. The population served includes a large number of dependents. Patients with chronic conditions requiring care beyond the hospital's capabilities are transferred by air to Army hospitals in Germany. The nearest Italian civilian hospital is seven miles away. The present hospital building was constructed in 1966 and is occupied on a lease rental basis. A dental clinic operates in a nearby building, the Senior Dental Officer having additional duty to the hospital. A medical facility which in effect an annex of the hospital operates some miles away at Gaeta. The hospital has a normal bed capacity of 70, an expanded bed capacity of 88, and, as of 1 August 1968, has 88 operating beds.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

A REVIEW OF THE EFFECTS OF SLEEP DEPRIVATION

Richard P. Tucker MD, Univ Mich Cen J 34(3):161-164, May-June 1968.

Much attention has been focused recently on the hallucinogenic or psychotomimetic drugs, principally LSD-25. The space program has given impetus to the study of sensory deprivation. There is a much more common hallucinogenic agent: sleep deprivation. Any parent whose child has missed a nap can describe abnormal behavior after lack of sleep. In 1893 a history professor named White said:

One sort of treatment used for those accused of witchcraft [was] the "tortura insomniae." Of all things in brain disease, calm and regular sleep is more beneficial; yet, under this practice, these half-crazed creatures were prevented, night after night and day after day, from sleeping or even resting. In this way temporary delusion became chronic insanity, mild cases became violent, torture and death ensued. . . .

The knowledge that loss of sleep affects behavior is neither new nor startling, and psychopathologic changes observed with sleep deprivation have been described. Man's sleep differs in many respects from that of other animals, so that research on deprivation needs to be chiefly in man. It would be easier to find subjects to take LSD than to find subjects willing to go without sleep for long periods. The study of sleep deprivation also presents a greater problem for the experimenter, since his subjects must be constantly observed for the same long periods.

Communist Interrogation

The most well-known recent example of sleep deprivation is found in Communist interrogation of war prisoners. In Korea, 38 of 78 captured American pilots confessed to war crimes as a result of interrogation techniques which included sleep deprivation combined with isolation, physical discomfort, and group pressures. In such a regimen a prisoner is placed in isolation and sleeps with the light on, facing the light and with his hands outside the blanket. He may be partially or totally deprived of

sleep. He may be required to stand, sit, or maintain uncomfortable positions. Everything is indefinite. After four to six weeks he becomes docile; he may develop delirium or hallucinations. He is fed but kept hungry. At this time he is taken to the interrogator, usually at night shortly after going to sleep. He is anxious for any human contact. Isolation and interrogation are continued until a suitable confession is signed. The interrogators usually have no formal training in psychology, psychiatry, or physiology, and generally have contempt for psychiatric theory. Chinese interrogators have increased physical discomfort by adding manacles, longer periods of standing, etc., and have added a long period of education after the confession called *Szu hsing Ksi Tsao* or ideological reform, known to us as "brain-washing." It may include pressure exerted by a group of about eight prisoners who have already "reformed" and are anxious for their new member to see the error of his way.

Sleep Deprivation and Transient Changes

Probably the first formal study of sleep deprivation was that of Patrick and Gilbert in 1896 when three instructors were deprived of sleep for ninety hours. The most striking finding was that one subject, a 28-year-old professor described as nervous, had what appeared to be hallucinations after the second night. He saw the floor to be covered with greasy-looking molecular particles; at times he felt these were in the air and tried to bat them away. They disappeared completely with sleep and did not return.

The most extensive study of sleep deprivation was that of Tyler in World War II. Since the primary function of the study was to evaluate anti-fatigue agents, the behavioral changes were not reported until ten years later. In all, 350 male subjects from age 17 to 35 were studied. All were military personnel. They were deprived of sleep for up to 122 hours, or nearly five days. The incidence of psychotic reactions was unrelated to the drugs given, which included amphetamines, barbiturates, placebos. Many

From the Department of Neurology, The University of Michigan, Ann Arbor.

neurotic subjects quit early because of fears of bad performance or of losing their minds, and this loss to the study may have decreased the incidence of psychotic behavior. Over 70 percent of the subjects reported visual or auditory misperceptions after forty hours, but only four experienced true hallucinations. One felt his mother and girl friend were watching from the testing room and demanded that they be sent away. Another felt that some of the examiners were women and demanded their discharge. Another insisted that he really heard dogs barking, and a fourth talked to an unseen person. Three experienced paranoid delusions. The first was a quiet, well-liked young marine who at 46 hours suddenly marched away from his group, became aggressive, felt that he was on a secret mission for the president to ferret out spies and traitors, and became incoherent. A second began crying hysterically that the others were trying to do him bodily harm because they were jealous of him. The last became very profane, started a fight with an officer and felt he was being forced to continue against his will. All recovered completely after sleeping. Unfortunately, there was no complete background history for these men, and no follow-up studies.

Bliss et al. kept seven medical students awake for 72 hours. In addition to misperceptions, they reported feeling separated from others in a strange way. None became psychotic except four who did so after they were given LSD. Whereas 1.0 mcg had been necessary for hallucinations before sleep deprivation, only half this amount produced hallucinations after deprivation.

Luby kept twelve male subjects awake for 123 hours. Overt hostility was noted in four. Depersonalization was a common occurrence. Most became somewhat paranoid, but only one had systematized delusions. At 100 hours he felt that his car had been stolen, that his fellow subjects were plotting to kill him, and that an attendant was going to stab him with a pen-knife. He called his wife to have her notify the authorities. After fourteen hours of sleep he still believed this, but blamed it on the experiment. Paranoid vestiges remained after a week.

Ross described a male high school senior awake 264 hours, or 11 days, who became irritable and uncooperative after the fourth day. He then saw a street sign as a person, and later transiently imagined himself to be a great Negro football player (he was white). During the last two days he had the delusion that a radio entertainer was trying to make him look foolish.

Berger and Oswald deprived six subjects of sleep for four days. Three had paranoid delusions. One felt the examiner was an interrogator and "inquisitor," one capable of inflicting exquisite pain. Another had delusions about bodyguards, and the third had a complex impression of being drugged and wrote nine pages about it. He felt the psychologist was a psychiatrist who had locked him up. All the subjects recovered in one day.

Deprivation Resulting in Lasting Illness

Perhaps of more practical importance are the effects of sleep deprivation in producing lasting illness. Brauchi and West in 1959 described sleep deprivation for 168 hours and 33 minutes in a radio disc-jockey. After the fourth day, memory lapses occurred. The subject felt that his broadcasting equipment was scattered in various cities. He wondered why there were no cars in the aisles of the building. He talked to a manikin. During the last two days of the week of deprivation he became disorganized and delusional, with transient auditory and visual hallucinations. The contest was stopped because of the onset of tremors and pedal edema. He was taken to a hospital but would not stay. He felt the Egypt-Israel conflict was his fault. He began to drink heavily. His affairs deteriorated and about three months later he was hospitalized with depersonalization and frightening *deja vu*. He had no hallucinations or delusions. He had had three previous psychiatric hospitalizations and had experienced some persistence of disorientation after a previous 89-hour marathon.

Bliss et al. described a 44-year-old woman whose son died after 27 hours in coma while she maintained constant vigil. She remained awake for three days and became grossly psychotic. She had religious delusions, went naked, and screamed gibberish. She recovered in seven days with the aid of electroconvulsive therapy. Eight months later she became anxious and again spent three days awake. She again became psychotic and recovered in six days, with drug therapy. A 51-year-old male with a schizophrenic sister spent four days without sleep, worrying about the school board of which he was a member. He then felt watched, as if the telephone were being monitored, and that God had given him special powers. Without the authority to do so he then fired a school clerk, a janitor, and the superintendent. He recovered in a few days.

Perhaps the most striking study is that done by Lehman and Koranyi in 1954 and reported in 1960.

Six schizophrenic male patients, aged 25 to 35 and hospitalized five to fifteen years, volunteered to go without sleep for 100 hours. Two had been classed as paranoid, two as catatonic, and two as hebephrenic; none had been known to hallucinate for at least two years. On the third day one of the catatonic patients had fantasies of incest, tried to escape, shouted, became agitated, then stuporous, and finally assumed a rigid posture which had not been seen for four years. By the end of the fourth day all had reverted to their admission state except one catatonic patient who showed some regression, with incontinence but no rigid posture. After ten to twelve hours of sleep, three returned to their pre-experimental status; the other three actually seemed slightly improved over their pre-experiment status.

Other Changes Seen in Sleep Deprivation

Ross described neurological changes, mostly ocular, in his report on eleven days of sleep deprivation. Two of six schizophrenics showed facial twitching. Visual misperceptions are perhaps the most prominent occurrence in sleep loss. West's subjects described high-frequency, rhythmic movements of stationary objects, then patterned forms, cobwebs, and rippling water during the first four to five days without sleep in what West calls the prodrome. Others have described patterns moving, swirling vapor, shimmering bubbles, crumbs moving like insects, faces of women, the floor larger and higher with pulsating tiles, or covered with shimmering water, fine smoke from the linoleum, a roll of luminous chicken wire, spots moving on the floor, micropsia, macropsia, nurses' caps undulating, fog and mist. One subject felt he had cobwebs on his face and hands and tried to wash them off. Formal tests of visual acuity revealed no deficits. One subject awake 123 hours showed a severe memory loss with some persistence for a month.

Auditory misperceptions have included harshness of loud sounds, unusual softness, and voices seeming distant. There were no changes generally on short tests of intellectual function, yet subjects were disorganized and incoherent with frequent silly laughter in informal moments. Speech became slower, softer, and slurred, with breaks in rhythm. One man wrote "too many schoolboys and school-girls working outside their school lessons. It is a result of the decadence of this country . . . kill too many birds with one stone . . . got to keep warm . . . grab my pubic hairs . . . goes from one to the other," yet he was never psychotic. Half of 37 subjects

deprived of 72 to 90 hours of sleep by Morris et al. showed rambling and vague speech with frequent topic shifts, intrusive thoughts, and neologisms. Some perceived their hands as larger, or had numbness of various body areas. Many experienced the sensation of wearing a hat. Temporal disorientation was common.

Deprivation of Types of Sleep

Dement and others have worked with deprivation of the stage of sleep during which rapid eye movement occurs. This stage of sleep, called REM sleep, is known to be associated with dreaming. These rapid eye movements are determined by placing electrodes on the eyelids and observing the rapidly shifting eye potential. REM sleep makes up 20 percent of the total sleep and starts about 90 minutes after sleep begins. Subjects deprived of REM sleep showed only the general effects of mild sleep loss, except one subject deprived of REM sleep for fifteen nights, with dextroamphetamine and arousal, who began to exhibit "striking behavioral changes." Unfortunately, Dement does not describe these changes. Sampson and Dement have shown that deprivation of REM sleep causes a selective increase in REM on recovery. Agnew deprived five subjects of stage-four or deep EEG sleep, and there was a selective increase in this stage when subjects were again able to sleep normally. Deep sleep takes precedence over REM sleep in recovery after general deprivation. This is why Patrick's attempts to elicit dreams from his subjects in 1896 by allowing them to sleep for a moment or so after deprivation were totally unsuccessful. Fiss et al. have awakened subjects during both REM sleep and stage-four sleep to administer psychological tests. After REM sleep, their responses were more vivid and bizarre, with a greater number of ideas and with longer stories in response to pictures. They had three times as many free association words as subjects awakened from deep sleep.

Chemical and Physiological Changes

Bliss found no changes in blood level or urinary excretion of adrenal steroids. Psychological changes such as visual misperceptions, hallucinations, and delusions occurred at about the same time interval as changes in the EEG waking record in Tyler's extensive study. Lehman and Koranyi reported an increasing eosinophil count and a weight gain possibly due to fluid retention. In 1962 Luby noted an initial increase in adenosine triphosphate activity

in red cells and then a continual drop after 48 hours. He concluded that there was a failure of mechanisms associated with energy production in the red cell and that adaptational energy could not be mobilized. We would have to guess that similar changes might occur in neurons. Recent experiments by Oswald showed that some subjects given oral L-tryptophan, a serotonin precursor, had unusually short times before the onset of REM sleep and that this effect was blocked by methysergide, a serotonin blocker. Narcoleptics who lapse into REM sleep spontaneously doubled their periods of REM sleep or paradoxical sleep with oral L-tryptophan and often had nightmares during these periods.

Summary and Conclusions

Many misperceptions, mostly visual, but also sensory and auditory, occur with sleep loss. Large numbers of normal subjects deprived of sleep for up to four or five days experienced these misperceptions, but only a few had psychotic experiences. Some patients seemed to have acute schizophrenic episodes secondary to sleep loss, generally transitory,

but some with more lasting effects. Long deprivation, ten to eleven days, seems invariably to produce true hallucinations. A five-day turning point has been reported after which disorientation becomes more frequent and prolonged, first as to time, then place, and finally person. Delusions occur often, usually paranoid. At night patients may seem delirious, but in the day schizophrenic. Interrogation of war prisoners often involves sleep loss as part of a total experience which may lead to a kind of psychosis. The understanding of the chemistry of sleep and its loss is still fragmentary. A review of published reports reveals striking differences between various studies, as well as some similarities. Certainly the expectations of the experimenters can influence the behavior of subjects. While nothing is proved still it seems that in some persons, anxiety and depression causing insomnia can establish a vicious cycle of sleep loss and increasing anxiety which may culminate in a psychological state closely resembling an acute schizophrenic reaction.

(The references may be seen in the original article.)

AN EXPERIENCE IN SUBMARINE PSYCHIATRY

Jonathan L. Serxner, MD, Amer J Psychiat 125(1):25-30, July 1968.

The psychiatric experience of a medical officer on two submerged Polaris submarine patrols, each lasting two months, is presented. One psychiatric emergency—an acute paranoid schizophrenic reaction—was managed, and some minor anxiety reactions and depressions were treated. The author suggests the nature of the submarine's psychological atmosphere by means of a brief discussion of the submarine as a physical entity, the patrol cycle, and the procedures of personnel selection and training.

The mere mention of prolonged submerged patrols tends to generate excited response from the general public. The psychological and psychiatric aspects of such patrols are of particular interest. Beyond being a matter of curiosity, this subject is becoming increasingly important as ever more men are serving in our growing fleet of Polaris submarines.

This report is based on a year-long tour of duty in one of the crews of a fleet ballistic missile submarine (FBM). Serving as medical officer on two cycles of "patrol" and "off-crew training" provided the author an opportunity for observing reactions to long "deterrent patrols"; it also presented the problem of treating an acute psychosis which developed on patrol. After reviewing stresses associated with these patrols, I will discuss psychiatric problems and treatment facilities on FBMs.

Background

The psychological and psychiatric problems seen on these patrols develop within a distinctive physical and organizational setting. This setting is defined by the design of the FBMs, the "two-crew concept" of operation, and the selection and training of personnel. Scrutiny of these factors reveals little reason to fear claustrophobia, sensory deprivation reactions, or a "madman pressing the button"—however much

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The views expressed in this paper are those of the author and do not necessarily reflect official U.S. Navy policy.

such thoughts predominate in speculation and fantasy about this subject.

The Polaris fleet is rapidly approaching its projected full strength of 41 FBMs—also called SSBNs (submarine, ballistic missile carrying, nuclear). Each nuclear-powered vessel carries 16 missiles with the mission of acting as a deterrent to nuclear attack on the U.S. by patrolling certain areas undetected, ready within minutes to launch its missiles at predetermined targets. No individual on the submarine can initiate launching without the aid of others. The combined efforts of many men in several different areas of the submarine are needed to bring the various systems to readiness for a launching. There is a set procedure for verifying an order to fire a missile which involves the captain and two other officers. All on board are impressed with the terrible destructiveness of these weapons.

Four classes of SSBNs have evolved, reflecting improved "states of the art" as technological advances developed at the time of their construction. The basic design of all is the same: an elongated forward portion (of three levels) tapering to the after portion (two levels). All four classes are about 400 feet in length, with operations and habitability areas forward and engineering spaces aft. Despite great density of machinery and equipment, there is at least 6 feet 4 inches from deck to overhead throughout, and one gets a sense of spaciousness.

Every FBM has two complete crews of 12–15 officers and 100–130 enlisted men. Each follows the same operational cycle of roughly 24 weeks. After a crew finishes its post-patrol leave period, it has an intensive training period (six weeks) using trainers and self-taught courses in its home port. The following week is for completing final details prior to the crew's flight to an advance replenishment base in time to meet the returning submarine. The fresh crew relieves the returning crew during the first four days after the submarine gets in; the fresh crew then takes the ship to refit it for patrol. After refit, there is the patrol of about 60 days during which the submarine is continuously submerged. During the ensuing training period, there will be a turnover of a certain portion of the crew. This provides experienced personnel for other assignments and gives time for those reporting aboard to be incorporated into the crew before the "on-crew cycle" of refit and patrol.

Submarine personnel constitute an elite group: they have met rigorous physical and mental standards, have undergone special training, and receive

additional pay for hazardous duty. All submariners are volunteers, although this does not mean that all are as highly motivated for submarine duty as that word might imply. Some volunteer more from a desire to leave their present command than from a desire to be on a submarine. When the demand for personnel is great, it may be filled by taking those who indicate that such duty is their sixth choice (out of six). However, the principle of a volunteer service, along with the screening of submarine school, essentially guarantees that no one having a great antipathy to being on a submarine will be found on one.

Some FBM personnel come directly from training facilities and some from other submarine duty. All submariners have had eight weeks (enlisted) or six months (officer) of submarine training prior to reporting to a boat for duty. (Special programs may add as much as a year of further training.) Basic submarine training includes some conventional and some unique physical and psychological screening. Pressure testing and escape tank training are unique. Trainees have to equalize their middle ears to pressure increasing to 50 psi in a chamber which is packed like a subway and has the atmosphere of a steam bath. Training for "Steinke Hood ascent" (the current method of escape from a disabled sub) starts in a small chamber with six men and an instructor. The chamber is pressurized and filled with water to shoulder level; the hood, a helmeted life vest, is pulled over a man's head; he then pulls himself through a submerged opening into the tank and ascends 50 feet constantly shouting "ho, ho, ho" (to ensure proper exhaling and to inform supervisory personnel that all is well).

Lt. Cdr. J. C. Rivera, MC, USN, has reviewed drop-outs from enlisted submarine training. Of all men reporting in recent years, roughly 15 percent have been dropped and about half of these (5–11 percent) have been dropped for medical reasons. Thirty-five to 40 percent of the medical drop-outs are for psychiatric reasons or for tank/pressure failure. According to Rivera:

Most of the cases classified as "Escape Training Tank or pressure test failure" could have been screened psychologically or administratively at their previous commands. . . . Some admitted fear of water or confinement, [or] poor motivation for submarine duty. . . . Others had a history of repeated disciplinary action or evidence of emotional instability or immaturity.

Psychic Stresses and Countermeasures

The first stress encountered in the on-crew cycle is that of leaving one's family to fly over to relieve the other crew (in Guam; Rota, Spain; or Holy Loch, Scotland). The result of this stress is perhaps felt more by the wives, as it is an impression of medical officers at a home-port hospital (Charleston, S.C.) that a period of increased illness begins when the father leaves for his submarine. (Discussions at the Bureau of Medicine and Surgery indicated that whether the incidence of disease increases or decreases at such times varies with whether the wife is a dependent or dominant type.) News of illness at home readily reaches the submariner during the month of refit; the staff (particularly its medical and clergy members) in the home-port work to mitigate the conditions generating stress at this time. When the illness is critical, emergency leave for return home is arranged.

The refit period itself can be quite stressful if a complicated, delicate piece of apparatus needs extensive repair and testing in the limited time available before patrol. Men deeply involved in this work sacrifice sleep and shore leave for days on end to "get the job done." The extent of such stress is limited as much as possible by the availability of expert technical assistance and by excellent delivery of parts and even replacements for entire units. Given sufficient evidence of decompensation, a man can be left behind (being replaced by another, when possible). However, there is a strong inclination to assume that a man will recover when the patrol with its less demanding routine begins. Though this assumption is strongly favored by probability, it does not always prove justified.

The officers and men seem to feel there is a primary threat about these long deterrent patrols, and they sense this on the level of being able to pass the time until the end of the patrol. Concern with this issue finds a very direct expression which is almost universal—"counting the days." Some cross off the days on a calendar, but more typically men have signs giving the number of days remaining. My own experience suggests a different emphasis because the midpoint of my first patrol was crucial, relieving a mild depression which began a few days earlier. I later realized the midpoint meant for me that "I only have to do what I have already done," and I felt that would not present a problem which I had not already successfully met.

Passing the time is accomplished with the aid of a broad program of activity. Everyone works; most

work two four-hour watches daily (e.g., 0800-1200 and 2000-2400), with certain additional work done in off-watch hours. (Other crews have six-hour watches with 12 hours off after standing watch.) Men usually work with members of their departments or divisions (six to 18 men). This work ensures mental occupation and socialization. Drills generate excitement (and anticipation) while—along with inspections—they promote "readiness" and a sense of community.

A most important group of activities is based on qualification programs (to become "submarine qualified" and to be authorized to stand various watches). Officers and men study manuals, teach one another informally, and finally present themselves to certifying boards composed of qualified shipmates. There are formal lectures, some obligatory and some voluntary, departmental lectures, "advancement in rate" lectures, and group study course meetings.

A recreation committee organizes special activities, such as casino nights, run as frequently as every Saturday night. Certain of the men take it upon themselves to be entertainers or to "raise the morale" of their watch section (or of the whole crew), often through highly imaginative joking. There is a different full-length feature film virtually every day; wire service news releases are available, and there is a 1,000-volume library. Lay leaders conduct weekly religious services, and the inevitable card games occur to one extent or another.

The commanding officer is decisive in determining the balance of activities, and I imagine that there may be a fair degree of variation from crew to crew. Some crews may exhibit much simple "hibernation"; my own did not. The food is excellent and a favorite topic of conversation; meals are social events (of differing orders of formality in the wardroom and the crew's mess), and, curiously enough, reducing is a popular activity.

Such activities do succeed in passing the time, although some of the activities—e.g., "qualification," with its pressures—occasionally create other problems. Inactivity per se does not seem to be an important stress (perhaps because of this program of activities); lack of opportunity to work on specific personal problems is a major stress. The other major stress is separation from family, which is almost complete. A man on patrol may receive three short messages from his family, but he cannot send any.

Sexual interest finds expression in several ways. Pin-up pictures are found in almost all areas where

permitted, from a few days after the patrol begins until its end. There was a tendency evident after two to three weeks to display pictures of grossly unattractive woman (apparently on a sort of "sour grapes" rationale). There seemed to be a low incidence of obscene literature. Sexual activity was a frequent topic of conversation. This topic, and vulgar language as well, seemed to me to reach a peak toward the middle of the eight-week patrol. It has been stated that "proper command attention can do much to increase morale and decrease this sort of intellectual abuse." Although my experience is not sufficient for me to be definite, I doubt that such talk always indicates low morale and I suspect that it may, at times, be of value in reducing tension and assuring men that they have feelings which are normal in such a situation. At any rate, this kind of talk seemed to me to be on a different level than that indicating anticipation of resuming marital relations; beginning several weeks before the end of the patrol the latter appeared with increasing frequency. There was a noticeable increase in general physical contact—back-slapping, accidental collisions, etc.—in the last seven to ten days of the patrol. This seemed in effect an expression of farewell to the community, which was shortly to dissolve with the start of the off-crew period. The last week or so was also the time in which what the men call "channel fever" appears. This is a state of excitement, occasionally with absent-mindedness, which is caused by anticipation of return to the green earth.

Only one man presented with a sexual problem in the course of two patrols. Two to three weeks after the beginning of a patrol a 25-year-old man complained that he was troubled by the meaning of his desire to masturbate. (This was a part of his concern about his wife's accusation that he was hypersexual.)

The inevitable personality conflicts and the proximity enforced by working, messing, and berthing conditions generated some resentment and there were a few altercations. I think the well-ingrained military sense of hierarchy served to hold these down; there was always somewhere else to go and someone who would give a sympathetic hearing to one's complaints. A frequently utilized means of releasing hostility was to have hyperbolic, "joking" insulting matches between individuals or "feuds" between small groups (e.g., the two groups successively having the same watch station).

The insults and feuds were always accepted as playful behavior and, indeed, often had a morale-

raising effect as a form of entertainment mentioned above; however, in some instances the facade was strained and long-lasting bitterness was engendered. Pecking orders were established in various groups although there were a few recognizable scapegoats, some apparently considerably enjoying the village idiot role. These people were habitually the butts of jokes. Self-censorship, or, in its rare failure, group censorship prevented these jokes from becoming offensive, and the butts of the jokes in almost all cases withstood the onslaught very well.

A small-scale study of the men's dreams during an off-crew period and the first half of the patrol failed to reveal any general pattern of change in the nature of frequency of dreams on patrol. An interesting finding was that two men from a group of eight studied had dreams involving death or impotence within the first few days following submergence for a 58-day patrol.

Psychiatric Disorders on Patrol

Five percent of the crew of 125 men and 12 officers were treated for psychological or psychiatric problems of varying degrees. Minor anxiety reactions constituted the most frequent group. At times these reactions presented as distractedness or low-grade anxiety attacks, but more frequently they were manifested by insomnia, headaches, or other somatic concerns. The precipitating situation was usually one in which the man involved was to undertake a major project—e.g., marriage, divorce, or a long-distance move to start at a school—shortly after the patrol ended. As the time for this project drew near the man began to anticipate it, felt frustrated in his desire to start preparing for it, and developed symptoms. In rare instances the anxiety reaction was due to long hours and self-doubt caused by pressure to perform in work or in a qualification program.

Depressive reactions were seen in several instances; anorexia with weight loss was noted in two cases. Unsatisfied dependency needs in individuals strongly attached to their families seemed to be the common element in the depressions. For the anxiety and depressive reactions the treatment was minor anti-anxiety agents, anti-depressants, and hypnotics, as indicated, along with support.

In the course of two patrols, one incapacitating psychiatric illness occurred. (This of course cannot be interpreted as statistically representative of psychiatric disease on FBM patrols. It is, however, representative of the situational stresses and of cer-

tain susceptible individuals.) A chief petty officer had an acute paranoid schizophrenic break after five weeks on his first submerged patrol.

This bright, highly motivated man had reported aboard during the off-crew period preceding the second patrol made by the crew to which I was attached. He was a highly qualified technical specialist with no submarine experience before reporting to submarine school a year and a half earlier; he had spent many of his 17 years in the Navy in instructor duty and other shore activities, and consequently with his family. Although he had had migraine headaches for 12 years, they had been quiescent for the preceding two years. The refit period had been difficult for his department in the manner described previously.

In addition, in his case, there was the problem of integrating himself and the other new men (one-third of the department) with the old hands. Further, he was confused about his role. Was he only to "orient himself" to the workings of his department on the submarine, or was he to follow his preferences? He would have preferred to have taken charge, as he had in similar situations previously. Although the chief was expert on somewhat more than half of the auxiliary equipment, he had not received formal training on the heart of the department's equipment on the submarine. This fact, plus the urgent nature of the department's work, fostered the practice of men bringing problems directly to the departmental officer rather than presenting them first to the chief, according to standard Navy procedures. The department had operational commitments around the clock which the officer attended and which the chief felt he should attend. (The officer had an uncanny ability, which the chief lacked, of going for days subsisting on cat naps.)

Almost immediately after the start of the patrol the chief's migraine headaches recurred on a daily basis, as he revealed only later. After two to three weeks he was expressing the hope that the headaches would not keep him from doing the job he knew he could do. At the end of the fifth week of the 58-day patrol, erratic behavior and grossly irrational talk were noted. The chief hallucinated voices talking about him and calling him names. A primary delusion was that his departmental officer was out to do him damage, at least "to break him" (from chief to ordinary enlisted man). He was relieved of his watch-standing duties and placed under treatment.

The nature of the treatment was dictated by the facilities on board, by the requirements for the safety of the submarine, the crew, and the man him-

self, as well as by the preferences of the medical officer. The facilities included an ample supply of phenothiazines, barbiturates, etc., and a straight-jacket, but no sick bay in which a man could be secluded. (There is a 12 x 6-foot medical office where drugs are stored, records are maintained, and minor procedures are performed.)

It would have been possible to use a small room where three men had been berthing, but I thought it would be preferable to disturb the patient's social environment and the crew's routine as little as possible. For the same reason I felt that adequate surveillance of the patient could be maintained without having two men withdrawn from their routine duties to have this as their exclusive assignment. What was done was to have the 15 other chiefs (with whom he berthed) rotate through watches around the clock with him, in addition to standing their usual watches.

Several modes of therapy were used. He was given phenothiazines in doses increased to 600-800 mg. a day and barbiturates in considerable doses, since insomnia and hypnagogic hallucinations were particularly distressing aspects of the disease. He was seen in frequent sessions; these were primarily supportive and ventilatory, with some interpretation being done. His fellow chiefs moved from a surveillance role (calling the medical officer when the patient requested or when his behavior seemed to merit it) to one of involving him in their activities in a way resembling as closely as possible that prior to his illness.

This treatment continued for three weeks, and the apparent response was gratifying. Shortly before the end of the patrol the chief had tried standing in noisy places to drown out the remnants of the hallucinations. He felt that if he could eliminate these he might escape hospitalization and return to his family when the rest of the crew returned. When the submarine docked he was transferred to the base hospital and from there air-evacuated, via a U.S. military medical facility in Europe, to the Philadelphia Naval Hospital (the Navy's east coast psychiatric center). After several months there, the chief was released for a trial of limited duty (non-submarine).

Acknowledgments

I am indebted to the late Dr. John Thompson who suggested that I study the dreams of men on prolonged submerged patrol. I wish to thank Capt. L. S. Smith, Jr., USN, who as my commanding officer encouraged my professional interests, Lt.

Cdr. B. T. Hogan, MC, USN, who suggested my reporting the management of a psychiatric emergency on a submarine, and Lt. Cdr. L. A. Johnson, USN, who consulted with me on technical matters. I am most grateful to Capt. R. L. Christy, MC, USN, Chief of the Neuropsychiatric Branch of the Bureau

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(The references may be seen in the original article.)

SILENT MYOCARDIAL INFARCTION

Walter Schweizer MD, Department of Cardiology, University Hospital, Burgerspital, Basle, Switzerland, Geriatrics 23(1):96-98, January 1968.

Silence is obviously a relative matter—there may be no sound at all or only barely audible sounds. On the other hand, even a loud noise can remain unheard if there is no one within earshot or if those who are cannot hear. The often used term “silent myocardial infarction” may therefore be interpreted in several different ways. To elucidate these let us start from the much clearer term “unrecognized myocardial infarction.”

Myocardial infarction may remain unrecognized and so escape detection in vivo for five main reasons.

(1) Sudden death can be the very first manifestation of an infarction. In these unfortunate cases there is obviously no time for diagnosis in vivo.

(2) Myocardial infarction may occur without producing any symptoms, that is, without pain or pain equivalents. The painless or otherwise asymptomatic infarction is “silent” for the patient. If he has no other reason to consult a doctor, the infarction will inevitably remain unrecognized, even if the electrocardiographic signs of infarction are present. This is the situation in about 10 percent of all cases.

(3) Myocardial infarction may provoke only minor symptoms. Mild acute angina of effort or mild chest discomfort of short duration may perhaps be the only manifestations of fresh myocardial infarction. If this happens in an imperturbable, preoccupied, or dull patient, the minor symptoms may not act as a sufficiently strong stimulus for him to consult a doctor. The myocardial infarction in these cases is not really “silent,” but is so faint that the patient does not pay enough attention to it.

(4) Myocardial infarction can take place not only without symptoms but also without producing any signs of diagnostic value, such as a typical Q wave or the typical behavior of serum enzymes. These

infarctions are “silent” for the doctor, even if the patient consults him in time and even if the doctor’s hearing, as it were, is intact. Furthermore, it is a well-known fact that the signs of infarction may only be transient. The enzymes return to normal levels within about two weeks, and the S-T segment changes can disappear after some weeks or months. Even the Q waves can lose their typical duration and amplitude after a period of months or years, especially after diaphragmatic infarction. The number of cases of unrecognized infarction must therefore increase proportionally to the time interval between the occurrence and the first medical examination, adding to the number of infarctions that are “silent” for the doctor.

(5) Finally, myocardial infarction can remain unrecognized even if the typical symptoms and signs are present and the doctor sees the patient in time. This unfortunately happens rather frequently under special circumstances. The doctor may, so to speak, not recognize the typical noise. He may not be able to hear it because other noises predominate. Or he may just not hear it at all. These infarctions are not “silent.” They escape recognition because the doctor is partially or totally “deaf.”

Considering all these different shades of meaning, it is not surprising that there is some confusion in the literature about silent myocardial infarction. One of the conspicuous signs of this confusion is the great variety of opinions about its incidence. It therefore seems to me that this confusing name should be abandoned and we should speak instead of “unrecognized myocardial infarction,” taking care each time to indicate the cause for nonrecognition. This would go a long way toward clarifying the situation and remind us immediately of what we should and could do to reduce the number of un-

recognized myocardial infarctions and to offer intensive coronary care to more patients.

There is not much that can be done to decrease the number of cases in Groups 2 to 4 as long as no provision is made for medical examinations of whole populations at regular intervals and as long as there are no new methods of detecting infarcted areas in vivo. The same, however, is not true of Group 5. We have recently been interested in finding out what immediate measures could be taken to reduce the number of cases in this category. We therefore made a retrospective analysis of the clinical records on file in the Departments of Medicine and Surgery (University Hospital Basle) pertaining to 164 patients with myocardial infarction proved at autopsy, in whom the infarction had remained unrecognized in vivo and who eventually died in hospital after a stay of more than two hours. To our astonishment, 50 of these patients belonged to Group 5, that is, there were 50 cases of myocardial infarction that had gone unrecognized because of partial or total "deafness" of the doctors, leading to inadequate investigation or inadequate interpretation of the symptoms and signs or both.

Study

There were five lessons to be learned from this.

(1) As long as chest pain or discomfort figures among the symptoms of high diagnostic value, questioning of the patient as to the presence or absence of pain prior to or at the beginning of the actual illness is indispensable, even if the interrogation is rendered difficult by the patient's mental state. Acute angina of effort or spontaneous chest pain of short duration can be an important clue that should arouse the doctor's suspicion.

(2) The electrocardiographic signs of diagnostic value may not appear until several days after the beginning of the infarction. It is therefore essential that electrocardiograms should be recorded daily

for five consecutive days if an infarction is suspected and the first tracings are normal or show only unspecific anomalies. Furthermore, we have been reminded of the fact that the typical Q wave may be found in ectopic QRS complexes only, and that the most frequent cause of a sudden deviation (within twenty-four hours) of the mean electrical axis (AQRS) to minus 60 degrees is myocardial infarction.

(3) Typical behavior of myocardial enzyme levels in the blood is probably the most reliable indication of myocardial necrosis. Typical means an increase and decrease within several days, although the values may remain within the so-called normal limits. Hence, it is certainly a mistake to determine the activity of serum glutamic oxalacetic transaminase once only if a myocardial infarction is suspected. The determinations should be repeated daily for at last five days from the beginning of the suspicious illness or until the diagnosis is firmly established.

(4) Initially, the clinical picture of myocardial infarction may be dominated entirely by symptoms and signs of various complications, such as paroxysmal dyspnea or frank intra-alveolar pulmonary edema without obvious cause, a sudden unexpected exacerbation of preexisting heart failure, left heart failure in a patient with preexisting right heart disease, collapse without obvious cause, or unexplained pericardial friction rub. It is therefore absolutely essential that several electrocardiograms should be recorded and enzyme levels determined daily in such patients.

(5) We have to be especially careful and vigilant in dealing with elderly persons, as diagnostic difficulties caused mainly by clouding of consciousness, cerebral vascular disease, and multiplicity of disease increase with age of the patient. More than half of our patients were over 70 years of age.

(The references may be seen in the original article.)

CUTANEOUS LIPOMAS AND LIPOMATOSIS

*Lamar S. Osment MD, Birmingham, Alabama, Surg Gynec Obstet
127(1):129-132, July 1968.*

The etiologic factors of lipomas are unknown. Lipomas of the skin are frequently noted while routine physical examinations are carried out. Usually, no recommendation for removal is made since they are most often asymptomatic. Malignant degeneration is a rarity. Lipomas may be single or multiple. Adair reported from Memorial Hospital that 6.7 percent of patients with lipomas have multiple lesions.

Adair further reported that 73 percent of 134 patients seeking medical aid for lipomas were women; the average age was 41 years. Antecedent trauma was related by two patients. In the same study lesions were most often seen on the back of the neck, the trunk, abdomen, forearms, buttocks, and thighs but seldom on the face, scalp, sternal region, and lower legs. Only four lesions were recurrent tumors, one recurring as a liposarcoma. Most lesions were relatively small, but two weighed 13 pounds and 4 pounds.

Muller in his comprehensive review and report of a family with multiple lipomatosis found a somewhat different occurrence pattern. He reports that lesions generally occurred in men in an eruptive fashion with occasional pain. A period of stability was reached. Rarely spontaneous regression occurred. Age of onset in general was during the fourth decade according to Muller; however, Moreira da Fonseca stated that one type (Roch) arises during infancy and adolescence. The lipomas of lipomatosis are strictly subcutaneous, relatively symmetrical, numerous, and rarely tender. Localization on trunk, arms, and thighs is typical. Four fifths of the patients with multiple lipomas are males.

Nomenclature for patients with multiple lesions has varied and includes the terms multiple symmetric lipomatosis, familial multiple lipomas, symmetric lipomatosis, hereditary multiple lipomata, lipoma multiplex, multiple subcutaneous lipomata, multiple circumscribed lipomata, adiposa tuberosa simplex of Anders, and simply lipomatosis.

Review of Pathologic Factors

Ewing calls attention to the striking connection between lipomas and their nutrient blood vessels. Each of the multiple lobules grow about a branch of

the main vessel. Lateral anastomoses are scant, so that the skin tumors are often readily shelled out. Extensive proliferation of blood vessels occurs in the angiolipoma type of lesion, such as lipoma telangiectaticum, or lipoma cavernosum. In 1910 Wells found no peculiarity in the fat of lipomas, no deficiency of lipase, and no reason to believe that lipoma fat is beyond reach of body use. However, lipomas may grow while the body becomes emaciated, as in terminal carcinomatosis.

Xanthomatous and mucinous changes appear in many lipomas. Cystic changes may also occur. Deep-seated lipomas in the thorax, abdomen, and cranium may exert pressure and cause serious symptoms. Other frequent locations include the oropharynx, retroperitoneal space, kidneys, and the tendons of the hands and feet. Malignant myxolipomas are encountered in the retroperitoneal region, in the hilus of the left kidney, and in the spermatic cord. According to Tedeschi, systemic multicentric lipoblastosis is the term which should be used in labeling recurring nonencapsulated fat tissue growths. These neoplasms involve scattered organs in a disorderly fashion and may be subcutaneous or located in internal cavities of the body. Tedeschi did not believe that these growths belonged in the category of fat tissue tumors in the strict meaning of the term.

Angiolipomas are more frequently painful, tender, and red than are simple lipomas. The reason for these symptoms is unknown. Howard and Helwig believe they follow a benign course, are preceded by simple lipomas, and differ from the latter by undergoing capillary and fibrous proliferation from the periphery.

Possible Etiologic Factors

Those authors who have given attention to the matter seem to agree that the one most important causative factor in multiple lipomatosis is the genetic one and that the mode of inheritance is a simple dominant. Some second trait must account for the preponderance in males.

On occasion other physical defects or conditions have been found to occur in patients with lipomatosis. These include multiple telangiectasia, neurofibromas, hyperkeratosis palmaris and plantaris, tabes, paresis,

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sciatica, xanthoma, rheumatoid arthritis, and alcoholism. Bean described one instance of ophthalmoplegia, steatorrhea, phlebectasia, and vascular lipomas. Gardner's syndrome is characterized by multiple polyposis of the colon, osteomatosis, and soft tissue tumors including fibromas and less commonly lipomas.

Some suggestions that lipomas are associated with systemic disease have appeared in the literature through the years, but no specific abnormality has been defined. Adair speculated that they were of neurogenic origin. Ewing states that it has not been possible to establish a relationship between lipomas and peripheral nerves as is seen in fibromas. This fact mitigates against the theories of some that lipomatosis is related somehow to neurofibromatosis. Ewing also believed that evidence was insufficient to suggest that local trauma played any role. Buschke advocated that trauma was an etiologic factor since many of his patients stated that lesions occur at sites of injury.

Without going into detail, other theories included many diverse etiologies as arthritis, circulatory disease, metabolic disease, endocrine disease, toxemia, syphilis, tuberculosis, and protozoiasis. Some authors have found hypercholesterolemia while others failed to observe this phenomenon. Paillard reports hyperuricemia and Cortelezzi found an increase in circulating eosinophils.

Relationship to Endocrine Disease

In 1959 Dugois, Couderc, and Gagnaire reported an instance of coexisting necrobiosis lipoidica diabetorum and familial lipomatosis. The patient was not diabetic. In 1955 Feldman and Weinberg and in 1961 Feldman reported the incidence of pathologic conditions associated with lipomas of the gastrointestinal tract as found at autopsy. The lipomas were encapsulated, and frequently they were multiple, as in 27.7 percent of the patients. Other benign gastrointestinal tumors were often found, including myomas and polyps. Fat necrosis of the pancreas was noted in four times as many instances as in the total autopsy population. Of 78 instances, 18 percent were associated with diabetes, while the incidence among the total autopsy population was only 10.4 percent. It is noteworthy that 18 percent of healthy relatives of diabetics are found to have diabetes when tested.

Ballard, Frame, and Hartsock in 1964 found lipomas in 11 of 85 patients under study for multiple endocrine adenomatosis. Multiple endocrine adenomatosis is related to the Zollinger-Ellison syn-

drome and is characterized by the concomitant occurrence of multiple tumors or hyperplasia involving endocrine organs and intractable peptic ulcer. The pancreas exhibited tumors in 69 of 85 instances. The tumors were multicentric, and both alpha and beta cell types occurred. Thirty-six percent of the patients in the series had hypoglycemia caused by hyperinsulinism. None were said to be diabetic.

Inheritance

The difficulties in distinguishing the patient with a single lipoma from those with multiple lipomatosis are apparent. Though an exhaustive search be made, there is always the possibility that a cutaneous lipoma may be missed. Unless they are symptomatic, the deep-lying ones would certainly be overlooked. In a recent series, patients with single lipomas tended less often to have relatives with lipomas than those with multiple lesions. Patients reporting other family members with probable lipomas, none of whom were examined, totaled nine of 36, or 25 percent. Only one of the 16 patients with a single lipoma gave a family history of lipomas. Eight of the 20 patients with two or more lipomas related that at least one other relative had one or more lipomas. None of the patients with single lipomas knew of any diabetic family member, while seven of those with multiple lipomatosis had relatives with diabetes. There was no correlation in family history of diabetes and family history of lipomas.

Discussion

Adipose tissue is a major site of fat synthesis and storage and is very active metabolically. Fat synthesis is markedly insulin-dependent; however, many factors—particularly hormonal ones—influence the release of free fatty acids from adipose tissue. The use of glucose in the presence or absence of insulin appears to be the main factor regulating lipolysis or lipogenesis. With decreased use of glucose, as occurs in untreated diabetes, lipolysis exceeds lipogenesis and consequently free fatty acids are liberated into the blood stream. Giving glucose to the starved animal or glucose and insulin to the diabetic animal has a reverse effect and decreases the liberation of free acids. Adipose tissue lipogenesis is practically abolished in alloxan diabetic rats and cannot be induced by large amounts of glucose.

Wells in 1912 had observed that lipomas are commonly undisturbed when the body becomes emaciated. At that time he found no deficiency of

lipase and no reason to believe that lipoma fat is beyond reach for body use. A recent observation of Marshall indicates that the metabolic behavior of adipose tissue from various parts of the body is different despite the fact that there are no differences in morphologic or fatty acid composition. An example is the response of facial fat to corticosteroid administration. Marshall found that there is, in fact, a lack of lipoprotein lipase activity in lipomas. Furthermore, Gellhorn and Marks have shown that the metabolism of the lipoma is different from that of normal subcutaneous tissue in that radioactive fatty acid precursors are taken up more rapidly.

Treatment

No treatment is usually necessary for cutaneous lipomas except for cosmetic reasons. In rare instances the tumors are large enough to be bothersome. These should be removed. Angiolipomas are frequently tender and should be excised for comfort.

Incisions should be made over the lipoma and extending the length of the tumor. Blunt dissection usually easily separates the thin fibrous wall of the lipoma from surrounding connective tissue. Occasionally there is no distinct plane of dissection and removal of all the fatty lobules is somewhat tedious.

Angiolipomas can frequently be removed by means of external pressure after a small linear incision is made over the tumor.

Summary

The etiologic factors of lipomas are unknown. Lipomas are always benign, but may be symptomatic because of their location. Many hypotheses on the cause of lipomas have been proposed. The hereditary nature of lipomas, especially multiple ones, has been established. Hereditary multiple lipomatosis occurs more frequently in males.

There are some observations to suggest that lipomas are associated, at least in some instances, with endocrine disease. Intestinal lipomas are more frequently seen in diabetic patients than in general. In a previous report, 11 of 85 patients with multiple endocrine adenomatosis had lipomas.

Recent fat research has shown that the metabolic behavior of lipoma fat differs from normal subcutaneous fat: fatty acid precursors are incorporated more rapidly into lipoma fat while lipoprotein lipase activity is diminished. Excision of cutaneous lipomas is rarely necessary.

(The references may be seen in the original article.)

SERUM IMMUNOGLOBULIN LEVELS IN BLOOD DONORS IMPLICATED IN TRANSMISSION OF HEPATITIS

*Gerald Bevan MB, MRCP; Howard F. Taswell MD; and Gerald J. Gleich MD,
JAMA 203(1):92-94, Jan 1, 1968.*

The increased serum immunoglobulin level that occurs in viral hepatitis may persist for at least one to two years after the acute attack. Similar changes have been found in 21 of the expected maximum of 36 carriers of hepatitis virus among 63 blood donors implicated in the transmission of hepatitis. Immunoglobulin assay may provide a useful screening procedure for potential blood donors.

The possible transmission of viral hepatitis remains one of the unsolved problems associated with blood transfusion. No single laboratory test has been found

to be consistently helpful in identifying the virus carrier. Some investigators have maintained that most proven carriers will have an abnormal result in at least one liver function test, whereas others have demonstrated that this is not always true. The tests that have been advocated as being the most useful when used singly are seroflocculation reactions, serum glutamic-pyruvic transaminase (SGPT) determination, and, more recently, a serologic test for the detection of antibodies to the viruses of hepatitis and infectious mononucleosis (HIM test). The main objection to these as screening procedures lies in the high percentages of false-positive values (or false-negative values in the case of transaminase determinations).

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The flocculation reactions depend principally on an increased level of γ -globulin in the serum but are also influenced by the lipoprotein fraction. We have examined the possibility that a quantitative assay of specific serum immunoglobulin (Ig) components might yield more precise information about the presence of the carrier state on the assumption that the persistence of the virus or of its effects constitutes a continuing antigenic challenge and results in antibody formation. Increased serum levels of IgG and IgM may persist, in certain circumstances, for many months in children who have had viral hepatitis. If a previous anicteric hepatitis infection is one of the processes that might be followed by prolonged survival of virus in blood donors responsible for the transmission of hepatitis, then similar increased levels of Ig may be found among them.

Method

Serum Ig levels were measured by radial immunodiffusion on small slides (commercially available) or by the large-slide method described by Fahey and McKelvey. The distribution of serum levels of IgA, IgG, and IgM was established in 448 blood donors; all had given blood used in at least one previous uneventful transfusion more than six months earlier, and none had ever been implicated in the transmission of hepatitis. The values obtained were compared with those found in 30 healthy adults who had 0 percent retention of sulfobromophthalein (BSP) and normal values for SGPT and serum bilirubin. There was no detectable difference between the two groups in the distribution of any class of Ig. Therefore, they were treated as a single control population of 478.

Results

In an initial study of 66 patients with viral hepatitis, examined at various stages after the onset of the disease, we found that, during the first month, in 93 percent the circulating level of at least one class of Ig increased above the 97.5 percentile of the control distribution. This increase persisted in some patients for many months; even after one to two years, 7 of 15 patients tested had an increased level of one or more Ig. Four of these seven patients had normal results in liver function tests. There was no significant difference in Ig distribution between patients with infectious hepatitis and those patients whose hepatitis was considered to have been contracted via parenteral routes, nor was there any difference between the patients with icteric dis-

Implicated Donors With Increased Serum Ig Level

Donors*	No. of Impli- cations	No. of Units, Trans- fused	Serum Ig Level† (mg/100 ml)		
			IgA	IgG	IgM
1	1	1	456	1,390	58
2	1	1	232	1,330	240
3	1	1	255	1,612	45
4	1	1	392	1,462	208
5	1	1	180	1,700	150
6	1	2	70	1,375	335
7	1	2	275	1,200	215
8	1	2	115	1,075	215
9	1	2	440	1,500	130
10	1	2	420	1,125	180
11	1	2	520	2,700	170
12	1	2	440	1,300	135
13	1	2	433	1,091	24
14	1	3	43	1,625	157
15	1	3	225	1,600	73
16	1	3	120	1,950	92
17	1	4	480	1,500	130
18	2	10; 2	315	2,000	106
19	2	7; 5	255	1,600	137
20	2	27; 23	95	1,180	225
21	5	18; 18; 8; 8; 4	260	2,000	19

* Thymol cephalin flocculation was normal in all except donors 12 (3 +) and 20 (not done). Serum bilirubin, alkaline phosphatase, and SGPT were measured in donors 16, 17, 18, and 21 were normal.
† Values in italics are greater than the 97.5 percentile (IgA, 410 mg/100 ml; IgG, 1,575 mg/100 ml; IgM, 190 mg/100 ml).

ease and the five patients with anicteric hepatitis. The degree of alteration of serum levels and the class of Ig affected were not constant for any given group or time period.

We then compared the serum Ig levels of 63 blood donors implicated in the transmission of post-transfusion hepatitis with those in the control group. Of the 63 implicated donors, 50 had been suspected as being a source of hepatitis on only one occasion. The remaining 13 had been implicated on two or more occasions. Some donors were strongly implicated (as a result of single-unit transfusions or of several episodes of hepatitis) and some were less strongly implicated (as participants in massive transfusions of as much as 64 units of blood).

The Table summarizes the increased serum levels found for the three classes of Ig among the implicated donors. An abnormal result was defined as higher than the 97.5 percentile of that Ig in the control group. An increased serum level of at least one class of Ig was found in 21 of the 63 implicated donors. Flocculation reactions were within normal limits in all but one of them. In addition, SGPT, serum alkaline phosphatase, and serum bilirubin were determined in four and were normal in each instance.

Of seven donors implicated in single-unit transfusions resulting in hepatitis, five had increased

levels of Ig (IgA, 1; IgG, 2; and IgM, 2 donors). One donor in each of 14 two-unit transfusions and one donor in each of two three-unit transfusions resulting in hepatitis (16 cases) were available for study. Eight of these 16 donors would be expected to be carriers. Six donors were found to have an increased serum level of at least one Ig (IgA, 2; IgG, 3; and IgM, 2 donors).

We were able to test 29 donors (representing all donors except three) in ten transfusions, of two to ten units of blood per transfusion, which resulted in hepatitis in the recipients. We would expect a maximum of one carrier in each transfusion panel or a total of ten carriers. We found that only one donor in each of eight panels had an increased Ig level (IgA, 4; IgG, 3; and IgM, 1 donor). All members of the other two panels had values below the 97.5 percentile.

Thirteen donors had been implicated on more than one occasion (two to seven times). Six of them had been implicated in relatively small transfusions (averaging 8.5 units per case of hepatitis), and three of these six had an increased Ig level (all IgG). One of the three had been implicated in five cases of hepatitis and the other two in two cases each. The donor implicated five times was found to have normal liver function when tested on many occasions over a period of a year. The remaining seven donors were all implicated on two occasions but in very large transfusions averaging 26 units per case of hepatitis. Only one donor with an increased Ig level (IgM) was found in this group.

If we assume that the carrier rate of hepatitis virus in the donor population is less than 1 percent, then we should expect there to be only one carrier among the donors in each transfusion panel that results in hepatitis in the recipient. Therefore, at least 27 of the 63 implicated donors would be non-carriers and thus the maximal number of expected carriers would be 36. We found 21 donors (58 percent) to have an increased Ig value. The class of Ig affected and the level to which each was raised were not constant.

Conclusion

Our results indicate that suspected carriers of hepatitis virus frequently have increased Ig values of one or another class. Increased serum level of Ig is a nonspecific finding, occurring in many conditions including acute and chronic infections, connective-tissue disorders, dysgamma globulinemias, certain skin diseases, and chronic liver disease, but any person known to have one of these conditions would not be acceptable as a blood donor. Moreover, if any of these conditions were undetected prior to donation, then demonstration of increased Ig levels would also make the blood unacceptable for transfusion. We therefore consider that measurement of serum Ig levels is a useful and practical routine screening procedure for blood donors. The method of Fahey and McKelvey provides a rapid, simple, and inexpensive system for performing large numbers of tests. On the basis of this preliminary study, the number of normal donors who would be lost because they fall outside the 97.5 percentile would be small compared with the gain from eliminating a large proportion of the carriers of hepatitis virus. A prospective study is in progress to evaluate these findings further.

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Assistance was provided by Lila R. Elveback, PhD, Section of Medical Statistics, Epidemiology and Population Genetics, Mayo Clinic. Many of the blood samples used in this study were supplied by Ned G. Maxwell, MD, Central Blood Bank of Pittsburgh; Allan G. Redeker, MD, University of Southern California School of Medicine, Los Angeles; Morton Grove-Rasmussen, MD, Massachusetts General Hospital; and Herbert Perkins, MD.

(The figure and references may be seen in the original article.)

MEDICAL ABSTRACTS

BONE ABNORMALITIES IN GARDNER'S SYNDROME

C. H. (Joseph) Chang, MD, et al, *Amer J Roentgen* 103(3):645-652, July 1968.

Various bone lesions in 15 cases of Gardner's syndrome in 2 families are reported.

Osseous lesions are benign osteomatosis consisting of dense bony proliferations of various size from slight localized thickening to large protuberant masses. The abnormalities appeared variable by location and general bony type.

Localized cortical thickening in the long tubular bones is the most common lesion. Protuberant and usually lobulated osteomas of the mandibular angle are a characteristic of Gardner's syndrome. The youngest patient with bone lesions in the author's series was an 8-year-old boy.

The bone lesions may precede the appearance of intestinal polyposis and may be an early sign of this disorder. Therefore, in the younger children of a family manifesting Gardner's syndrome, careful and frequent follow-up studies are essential, even though original or early studies were negative.

ZOLLINGER-ELLISON SYNDROME

Lawrence Way, MD, et al, *Amer J Surg* 116(2):293-304, Aug 1968.

Multiple endocrine adenomatosis was identified in 48 percent of 25 patients with the Zollinger-Ellison syndrome. This figure is twice that in Ellison's series and is probably closer to the true incidence. Eleven patients had hyperparathyroidism, five had adrenal hyperplasia or adenomas, four had pituitary tumors, three had thyroid tumors, one had carcinoid tumors, and two had hyperinsulinism. It should be emphasized that a patient with hyperparathyroidism and peptic ulcer disease is likely to have ulcerogenic pancreatic tumors. All patients with the Zollinger-Ellison syndrome should be investigated for hyperparathyroidism. Diagnosis is often difficult with presently available technics. Positive information in the form of a high basal to maximal acid output ratio, bioassay positive for gastrin, or demonstration of an islet cell tumor is quite reliable. Negative information is less helpful in attempting to exclude the diagnosis.

Total gastrectomy has been very successful as treatment for this disease. Since it is curative and

is associated with little nutritional morbidity in these patients, total gastrectomy is the only recommended operation except in patients with primary ectopic tumors; these patients are successfully treated by tumor excision.

CALCITONIN (THYROCALCITONIN)

Giraud V. Foster, MD PhD, *New Eng J Med* 279(7):349-360, Aug 15, 1968.

Calcitonin is a calcium-regulating hormone secreted by the thyroid gland and the ultimobranchial bodies. Collectively, the cells involved in its secretion constitute an endocrine system only recently appreciated. In response to hypercalcemia, they release a polypeptide hormone that rapidly lowers blood calcium by inhibiting bone resorption.

The active principle has been isolated, its composition determined, and many of its properties defined. The hormone may play a part in a number of clinical conditions and, in addition, may have therapeutic uses.

The physiologic role of calcitonin is not known. Three possibilities exist.

The first is that the principal function of calcitonin may be to regulate blood calcium levels. Calcium is important in many basic processes, including muscle contraction, blood clotting, cardiac rhythmicity, nerve conduction and many important enzymatic reactions. Blood levels, therefore, require precise regulation. This may be achieved conjointly by parathyroid hormone and calcitonin, oscillations in blood calcium produced by changes in the secretion rate of parathyroid hormone, the slower acting hormone, being prevented by calcitonin.

Secondly, calcitonin may moderate bone growth and remodeling. Together with parathyroid hormone it may regulate the continual process of resorption, which can be viewed as the mechanism whereby the body maintains normal healthy bone. No evidence discounts this possibility.

Finally, the principal role of calcitonin may be to control calcium balance. Parathyroid hormone affects calcium metabolism by increasing resorption of bone mineral, augmenting calcium from the gastrointestinal tract and increasing the renal calcium tubular reabsorption. By preventing the action of parathyroid hormone on bone, calcitonin may allow the calcium-conserving effect on the kidney and gut to remain unopposed.

TREATMENT OF THYROTOXICOSIS

John Eager Howard, MD, *JAMA* 202(8):706-709
Nov 20, 1967.

Uncomplicated thyrotoxicosis can be treated by completely blocking production of the patient's own hormone with full drug dosage and, once this has been achieved, gradually administering thyroid to full replacement dosage while continuing administration of the blocking agent. After about six months, the blocking agent may be withdrawn to see if remission has occurred. This procedure can be carried out with minimal risk and with complete comfort to the patient once the initial thyrotoxicosis is controlled. Furthermore, any skilled clinician could carry it out without resort to any of the elaborate diagnostic procedures. In the author's hands the regimen has proved highly satisfactory. Whether or not continued administration of full replacement doses of thyroid hormone lessens the likelihood of future relapse, time alone will tell. Nevertheless no harm is seen in the procedure, either theoretical or, so far, in fact. The authors shall continue to use the regimen unless it should prove to be harmful; or at some future date, when the cause of thyrotoxicosis becomes clear, they may with equal safety attack the cause. The greatest sire of success is success itself.

COURSE OF DERMATOMYOSITIS-POLY-MYOSITIS: COMPARISON OF UNTREATED AND CORTISONE-TREATED PATIENTS

Richard K. Winkelmann, MD, et al, *Mayo Clin Proc* 43(8):545-556, Aug 1968.

Two hundred eighty-nine patients with dermatomyositis-polymyositis were studied for their response to therapy. Ninety-six patients achieved remission, and 80 patients died with their myositis. Forty-seven patients receiving high-dose steroid therapy achieved remission, and 48 patients who had no therapy achieved remission. The decreased morbidity and the rate at which remission is achieved suggest that steroids should be used. Low-dose steroid therapy does not give favorable results. Malignant tumors were related to the onset of myositis and were also found in patients who were in remission. Successful treatment for malignancy and myositis is possible when they occur alone or together. Neither the duration of the disease, mode of onset, nor sex was related to the death rate. Rapidly progressive and widespread disease had a worse prognosis. Cardiovascular and pulmonary complications were frequently the cause of death. A classification system for myositis is proposed that recognizes its course and the associated pathogenic states.

DENTAL SECTION

THE CHILLED SILVER CONE AS A ROOT CANAL FILLING MATERIAL

LCDR Robert E. Cassidy, DC USN and
CAPT Worth B. Gregory, Jr., DC USN.

Over two hundred and fifty different materials have been used to fill root canals. Despite some valid criticisms of silver cones, there are certain indications for the use of this popular material as the master point. In an effort to improve the existing silver cone method of filling root canals, a chilled silver cone technique has been developed that relies on the malleability of silver, on silver's contraction and expansion with temperature change, and on the elasticity of dentin. A preliminary *in vitro* study was conducted on forty-two freshly extracted

teeth. In Phase I fitted silver cones were cooled with freon to a possible 60°C causing a decrease in cone diameter of at least 0.01 mm. The chilled cones were cemented in canals prepared through the apex. By measuring the distance that the cones moved beyond the apex, 0.5 mm was determined as the amount that could be cut off the apical tip of a fitted silver cone and still allow the chilled cone to seat to the original working distance in the sealer-coated canal. Phase II consisted of a practical demonstration of the chilled silver cone technique in conventionally prepared root canals. The silver cones were fitted; 0.5 mm was removed from the apical tip of the cones; they were then cooled with freon and seated to the working distance in the sealer-lined canals. Upon warming to body temperature the silver cones apparently expanded against the walls of the root canals, probably providing a

The opinions and assertions contained herein are those of the authors and are not to be construed as reflecting the views of the Navy Department or the naval service at large.

more adequate seal without causing fracture of the teeth. In the clinical practice of the authors the use of silver cones is limited to filling small, tortuous canals and no adverse effects have been noted using the chilled silver cone technique clinically.

(Abstracted by: LCDR R. E. Cassidy, DC USN.)

EFFECT OF TIME OF EXTRACTION ON RESOLUTION OF ODONTOGENIC CELLULITIS

*H. D. Hall, J. W. Gunter, Jr., H. C. Jamison, and
C. A. McCallum, Jr., J Amer Dent Ass
77(3):626-631, Sept 1968.*

A comparison was made of the effects of immediate extraction and delayed extraction on the resolution of an acute odontogenic cellulitis. Three hundred and fifty patients were divided into two treatment groups, one group to have immediate extraction and one group to have the extraction at the third or fourth day of treatment. Except for 6%

of the total, all extractions were accomplished using a local anesthetic. Adequate supportive therapy was given where indicated. Specific criteria (pain, swelling, oral temperature, lymphadenopathy, etc.) were used in the clinical evaluation. Due to missing data, 321 patients were used in the final analysis. Early extraction reduced the necessity for incision and drainage (I and D) and resulted in a more rapid recovery until about the fourth day of treatment. In 172 cases, immediate extraction did not result in the spread of infection, even when the patient did not receive antibiotics (30%).

It was concluded that early extraction in cases of odontogenic cellulitis does not contribute to the spread of infection and significantly reduces the problems normally associated with this type of infection. Therefore, the preferred treatment should be extraction of the infected tooth at the earliest possible time.

(Abstracted by: CAPT Howard S. Kramer, Jr., DC USN.)

PERSONNEL AND PROFESSIONAL NOTES

CASUALTY TREATMENT TRAINING COURSE

Thirteen dental officers of the U.S. Navy and one civilian dentist, representative of the American Dental Association, have completed the Casualty Treatment Training Course at the Naval Dental Clinic, Norfolk, Virginia. The course, under the supervision of the Bureau of Medicine and Surgery, is conducted to develop in dental officers such skills in emergency casualty treatment as to make full use of their professional knowledge, thus enabling them to amplify the medical effort in time of major emergency. This is the third course to be conducted here this year. Similar courses are held at Bethesda, Maryland; Great Lakes, Illinois; and San Diego, California. Attending the course here were: CDR H. B. McWhorter, DC USN; LCDR J. C. Lufkin, DC USN; LT M. R. Mack, DC USNR; LT J. E. Hoppe, DC USNR; LT L. D. Hensley, DC USN; LT W. S. Bate, DC USN; LT R. B. Abrahamian, DC USNR; LT D. L. Radcliffe, DC USNR; LT W. P. Acco-

mando, DC USNR; LT R. J. Sundberg, DC USNR; LT F. X. Neuner, DC USNR; LT V. N. Commercio, DC USNR; LT G. A. Thorne, DC USNR; Dr. Ford T. Johnson.

The Casualty Treatment Training Course was under the direction of CAPT W. B. Gregory, DC USN. RADM M. E. Simpson, DC USN, is Commanding Officer of the Naval Dental Clinic, Norfolk. CAPT J. F. Link, DC USN, is Executive Officer.

MILITARY SYMPOSIUM FOR NAVAL RESERVE DENTAL OFFICERS

A Military Symposium for Naval Reserve Dental Officers will be held from 1730 to 1930 on 2 December 1968 in the Penn Top North, Statler Hilton Hotel, New York City, N.Y. The Symposium, which will be held in conjunction with the Greater New York Dental Meeting, is authorized one retirement point for accreditation to eligible Naval Reserve Dental Officers who attend.

NURSE CORPS SECTION

THE ROLE AND FUNCTION OF BEDSIDE NURSING FOR THE FUTURE

Marilyn D. Willman, PhD.

The following speech was presented to the Nurse Corps officers at an in service meeting at the Naval Hospital, Corpus Christi, Texas. Dr. Marilyn D. Willman is Dean, The University of Texas School of Nursing, Austin, Texas.

My topic for this evening has been announced as "The role and function of bedside nursing for the future." I would like to take the liberty of altering the title to emphasize the person rather than the function and thus deal with the professional nurse of the future. This is not to deny that bedside nursing is an essential element in professional nursing, but to emphasize that professional nursing is much more than bedside nursing in the traditional hospital setting.

No doubt it will be immediately clear that I am making a distinction between the professional and the technical nurse. This is not to disparage technical nurses, for their contribution is an essential one on the nursing team. Preparation of the technician in nursing differs as it does in other fields, such as engineering from the preparation of the professional practitioner in the amount and scope of knowledge incorporated in the educational program. As Martha Rogers has so clearly stated, "For years nurses have been asking what is the difference between what baccalaureate graduates (professional) do and what hospital and associate degree nursing graduates (technical) do. And when one asks the wrong question one of course gets the wrong answer. The difference between the two groups lies in what each knows. It is the body of knowledge possessed by each group that differentiates the practice of each group. Nor is this a derogation of hospital school or associate degree graduates. Hospital school and associate degree graduates have every right to be proud of the career they have chosen and to seek excellence in their practice. They do not have to be something else." The technical nurse functions most effectively with professional nursing direction and, in this sense, a clear definition of the role of the professional nurse will help to define more clearly the role of the technician in the nursing care of patients.

My approach to the discussion of role and functions of the professional nurse will be through a description of the nurse and her characteristics

rather than an examination of the activities she undertakes.

The first essential characteristic of the professional nurse is leadership. Her role will increasingly become that of leader in the provision of nursing care in many different settings. I speak here of nursing care in addition to and different from carrying out the therapeutic regime prescribed by the physician. Implied in this kind of nursing care is an independence of function, which is seen most effectively today in the performance of the clinical specialist in institutions where nurses have been utilized in this way.

The second descriptive term for the professional nurse of the future is diagnostician. There is some hesitation to use this term in nursing because of its historic association with the physician; however, if nursing care is to be something unique contributed by the nurse to the health care of patients, a nursing diagnosis is a very appropriate foundation upon which to base action. The science upon which we base our nursing diagnoses is more nebulous than medical science, and we often utilize intuition more than science. Nurse scientists are seeking, however, to define a body of nursing science through research, drawing upon many theoretical bases. That we may some day have as sound a foundation for nursing diagnoses as does the physician for medical diagnoses is now a goal possible of realization.

The professional nurse is also an interventionist; in fact, there is increasing discussion of the concept of "crisis intervention" and the nurse as a significant agent in assisting patients and families through such crises as terminal illness, the birth of a retarded child, or the disfigurement of a radical surgical procedure. On the basis of the nursing diagnosis, the professional nurse establishes a plan for intervention utilizing her own skills or those of others in the patient care team as they can most effectively assist the patient or family in the resolution of the crisis. My examples of crisis situations are extreme, but it must be clear that for many patients a first illness and hospitalization are crises requiring of the professional nurse precisely the kind of planned intervention described above.

The professional nurse of the future must become a more effective health teacher than is the case at

present. Our emphasis must be upon prevention of illness and injury as well as an adaptation to the crisis of illness, and the nurses's practice setting will become, in addition to the hospital, the community with its variety of health-promoting settings. We have given lip-service in our educational programs over the years to patient teaching and the nurse as teacher. We have provided opportunities for teaching the technical aspects of the treatment of diabetes, how to bathe a baby and prepare formula or how to care for a colostomy, but these are "procedures" in the strictest sense of the work and can be taught by technically skillful personnel with the assistance of audio-visual materials. The kind of teaching which should be expected of the professional nurse may incorporate such content, but goes further by assisting the learner to adapt to the situation in which he finds himself as a result of his own illness or that of a family member. Such teaching implies a depth of understanding of the physical, biological, medical, and behavioral sciences, and the ability to synthesize these into a meaningful approach to the teaching of patients and families. In this regard I should like to introduce and briefly discuss the concept of high-level wellness. A number of our faculty members have become very interested in the relationship of this concept to professional nursing and they are now introducing students to high-level wellness during the first course in nursing. This concept was developed by Dr. Halbert Dunn and is defined as "an integrated method of functioning which is oriented toward maximizing the potential of which the individual is possible, within the environment where he is functioning." The following quotation from Dr. Dunn's book specifically concerns the point to which I have been addressing myself, "Why is it that doctors and nurses and health workers so frequently forget the meaning of this definition? For, even while they quote the words, they tend to focus upon disease, disability, and death, to the exclusion of these other factors. Perhaps this is because their training has been oriented toward disease rather than toward positive wellness; and they therefore find disease more *interesting* than wellness. Also, it's easier to fight *against* sickness than to fight *for* a condition of greater wellness."

The previous descriptions of the professional nurse imply the additional descriptive term collaborator. One immediately thinks of physician-nurse collaboration in the care of the patient, but the nurse is frequently the primary collaborator with the numerous other disciplines concerned with the patient in

both hospital and community. Inter-disciplinary clinics are perhaps the finest example of true collaboration for patient welfare, with each professional making his unique contribution to the planning. Nurses have been slow to function effectively in this manner, often because their level of education has been such that they have been unable to communicate with members of other professional disciplines on the same intellectual level. The nurse as collaborator must be a nurse with such professional and academic preparation that she meets other professionals on an equal basis.

Finally, the professional nurse is a communicator—of information about patients to other members of the health professions, of information to other members of the nursing team, of information to patients, and last but not least, of new knowledge to her colleagues in the profession. Her educational preparation should include increased opportunities to develop verbal and written communication skills, and she must recognize the several aspects of the communicator role as essential characteristics of the professional practitioner.

I have thus defined the professional nurse of the future as a leader, diagnostician, interventionist, teacher, collaborator, and communicator. I have moved this practitioner from the confines of the hospital and the bedside to community health agencies and the patient's home setting and broadened the area of concern from the immediate reason for hospitalization to prevention of illness and injury, rehabilitation and the attainment of the highest level of wellness possible for the individual. I am quite aware that this conception of the professional nurse is not new, but I submit that he does not now exist in large enough numbers to fulfill the potential that professional nursing has for meeting health care needs in this country. Furthermore, it is doubtful that, without revisions in patterns of professional nurse utilization, he would be allowed to function in the ways set forth above. However, the insufficient number of such practitioners has nothing to do with the infamous shortage we are always seeking to alleviate. It arises from the fact that most baccalaureate programs are not presently preparing the level of practitioner that I have been discussing. For this reason, my description can only be that of the professional nurse of the future, an ideal toward which to strive.

Another quotation from Martha Rogers offers, in my judgment, an accurate characterization of the status of professional nursing:

The emergency of professional education and practice in nursing is an expression of nursing's history, a recognition of changing times, and a vision of the future.

Change in nursing is a reality. . . .

Contemporary nursing is a major social force. It is continually molding and being molded by the culture in which it exists. Man's capacity for initiating change is also the capacity of nurses for envisioning the future and determining sound direction in the great task of building a healthy society.

OCCUPATIONAL MEDICINE SECTION

ASBESTOS HAZARDS IN NAVAL DOCKYARDS

*P. G. Harries, Devonport, England, Ann Occup Hyg
11:135-142, Pergamon Press 1968.*

Abstract—A brief description is given of the types of asbestos materials, and their uses in shipbuilding and ship repairing in Naval Dockyards. An outline of the problems to be faced and a description of preventive methods is followed by a series of questions intended to stimulate practical solutions to the problems of using asbestos materials safely in the industry.

So much has been written and spoken about asbestos in the last five years that it might seem irrelevant to add any more to the vast mountain of words, facts and figures already expounded.

I know that there is a keen awareness in Newcastle of the problems associated with asbestos in the shipbuilding industry and that a great deal of work has been, and is being done by the Department of Occupational Medicine to further knowledge of the disease and to suggest a suitable code of practice for the use of asbestos in the industry.

I have come to Newcastle hoping to learn, and I hope to put specific questions to you, the answers to which we must know if we are to deal effectively with the problems of using asbestos safely.

I think it fair to begin by outlining the problems as I see them, to describe what the Navy is doing about them, and then to ask for your solutions to them.

The Industry

There are four Royal Dockyards in this country, at Portsmouth, Devonport, Chatham and Rosyth, and a small amount of refitting work is done in Singapore and Gibraltar. These remarks are confined to the four home dockyards who between them em-

ploy some 50,000 civilians. About 17,000 men work afloat on the ships while the remainder work in the shops, factories and docksides. Less than 450 men are classed as asbestos workers and only the 50 men who work in the asbestos mattress shops are subject to the Asbestos Industry Regulations.

Most of the work carried out in the Royal Yards is refitting and repairing ships, rather than shipbuilding which accounts for most of the work undertaken in the civilian yards. The extent of the refits also differs in that naval refits are usually much more extensive and often involve the removal and replacement of nearly all the insulating material in machinery spaces. As the removal of lagging material gives rise to more dust than its application these are very important differences.

For these reasons, and for the many engineering and constructional differences between naval and merchant ships, I believe that the overall exposure to asbestos is likely to be higher in the Naval dockyards than in their civilian counterparts.

Materials

The asbestos materials used in Naval ships are largely the same as those used in the Merchant Fleet. Changes have occurred in the amounts and types of material used which I think may help to explain the emergence of asbestosis in the dockyards as a problem at this time.

From the start of this century to about 1950 most of the machinery insulation was in the form of asbestos mattresses, 85 percent magnesia sections containing 15 percent amosite, and asbestos cloth. A certain amount of crocidolite was used in fibre form for mattresses, and in some asbestos board.

From 1950 onwards more efficient insulation was required and magnesia sections were replaced by massive amosite sections consisting almost entirely of asbestos. The dwindling stock of amosite sectional lagging is still being used in small amounts but calcium silicate section containing only 12–15 percent amosite has been increasingly used since 1963.

The use of large amounts of amosite section from 1950 onwards has meant that there has been a great increase in the amount of asbestos exposure over the last seventeen years.

The sprayed asbestos process was used extensively in naval ships from the end of the war until 1963 when it was discontinued, largely for reasons of weight. Nearly all the fibre used in this process was blue, but amosite fibre was sometimes used.

There are very many other uses of asbestos containing materials in ships and it is difficult to find a compartment in which there is no asbestos. It will be realized that most of the asbestos is used for heat insulation although extensive use has also been made of asbestos sound and electrical insulating materials.

Processes

Mattress making. In each dockyard this is carried out in shops equipped with exhaust ventilation cowl in which the mattresses are filled with amosite fibre. Working conditions are good and dust concentrations are low. Some crocidolite has occasionally been used in the past and the men preferred it to amosite as it was less dusty and less spiky than amosite. Wyers (1946).

Lagging. The application and removal of heat insulating materials is mainly concentrated in the machinery spaces aboard ships and present practice is to lag all hot faces above 150°F with calcium silicate sections covered with asbestos cloth. Cutting and fixing sections, rope and cloth does give rise to localized high dust concentrations, but the highest dust concentrations occur during removal of old lagging material.

Hot and cold water pipes and ventilation trunking throughout the ships have previously been covered with asbestos cloth, but this is now replaced by cork, felt and canvas.

Asbestos spraying. This process was extensively used for environmental insulation until 1963 when it was completely discontinued. The existing material is extensively removed during refits and is being replaced by glass fibre. The dust concentrations during removing the dry material are very high.

Application of sound insulation. Asbestos boards of various types and thicknesses have been sawn and fitted for sound insulation and removed during subsequent refits. This work is done by joiners, and again the highest dust concentrations occur during removal of the old material.

There are many other minor processes involving the fitting or removal of asbestos materials some of which do produce dust. Examples are the fitting and removal of asbestos in galley equipment; sawing and fitting friable asbestos board for ironing boards, cleaning with wire brushes, pipes and glands previously lagged with asbestos. Most of these procedures are carried out intermittently by men who are considered to be "asbestos workers."

The Men

First impressions of the problem would suggest that only those men continuously working with asbestos are at risk. In the dockyards these men would be the mattress workers, ladders, sailmakers working with asbestos cloth, asbestos sprayers and strippers, and storeman. Experience has shown, and further consideration of the industry and processes should suggest, that many other men have been at risk.

As most of the asbestos has been applied and removed in machinery spaces it is amongst men working mainly in these compartments that we might expect to find evidence of the disease. Table 1 shows the occupations of men in Devonport Dockyard who are NOT recognized asbestos workers, and who have been accepted by the Pneumoconiosis Panel as suffering from Asbestosis in the last year. All these, with the exception of the joiner and shot blaster, work on ships mainly in machinery spaces. The joiner cuts, fits and tears down Acoustic insulation periodically. The shot blaster spent years cleaning and blasting asbestos coated pipes.

TABLE 1. *Occupations of Men with Asbestosis**
(Devonport Dockyard)

Boilermaker
Electrical fitter
Engine fitter
Engineer
Iron caulker
Joiner
Plumber
Rivetter
Shipwright
Shotblaster
Stoker
Welder

* Other than asbestos workers.

Table 2 shows the occupations of men histologically proven to have been suffering from pleural mesothelioma in Devonport Dockyard. It will be seen that none of these is a recognized asbestos worker but that they have all had considerable asbestos exposure on ships under refit.

TABLE 2. *Occupations of Men with Pleural Mesothelioma*

(Devonport Dockyard)
Boilermaker
Fitter
Labourer on ships
Shipwright
Welder

The Problems and Current Action in H. M. Dockyards

I have attempted to show that as an industry the Navy uses large amounts of many different products containing asbestos in varied and difficult working conditions. The work often gives rise to high dust concentrations and many people working near the different processes may be exposed to the hazard. We know that men other than those working directly with asbestos are contracting asbestosis.

At present the uses of all asbestos containing materials are being studied with a view of using alternative materials, and crocidolite is being excluded from ships. Where substitution is not possible and asbestos materials are used, or existing asbestos materials are removed, the following precautions are taken.

As far as possible the work is isolated and only those actually involved in the process of lagging or stripping are allowed into the compartment. Where possible, supply and exhaust ventilation through a filter is provided but satisfactory ventilation systems are most difficult to arrange.

As dust suppression is not possible we have to rely almost entirely on personal protection. Where large amounts of machinery lagging, sound insulation, and particularly sprayed asbestos is to be removed then the men wear impervious overalls made either of P.V.C. or rubber, and an air line P.V.C. hood supplying fresh air via the dockyard compressed air lines. Despite the difficulties of the work, and the discomfort of the overalls, the men have removed over 500,000 ft of sprayed crocidolite asbestos from H.M.S. Ark Royal using this form of protection. At present we also have on trial Positive Pressure Powered respirators manufactured by Martindale Electric Co. Ltd., which are proving very popular with the men. They have the advantage of supply-

ing adequate filtered air making them very comfortable to wear, and do not have the disadvantage of the trailing air hoses which are difficult to untangle in the confines of a boiler room.

For the application of lagging or sound insulation materials, and in the stores when moving or cleaning asbestos, Siebe Gorman Mark VIII dust respirators are worn together with Bri-nylon overalls. Experiments are planned to lag the pipes in the shop and fit them ready lagged.

The asbestos debris is bagged in paper sacks, sealed and carried off the ship after the end of normal working hours. The bag is then pierced with a probe, filled with water, and placed in a barge from which it is eventually dumped at sea. The ship's compartments are cleaned with industrial vacuum cleaners by men wearing full protective clothing.

All the men who are expected to work most of their time with asbestos have initial and annual medical examinations and chest x-ray at the dockyard medical centers, and this has been the procedure from the beginning of lagging in the dockyard.

What we are doing is to limit the amount of asbestos used, to limit the number of men exposed to the dust and as far as possible to protect those who have to be exposed to the dust.

All this is expensive. Refit schedules are now planned to exclude other trades from compartments in which removal of lagging or sprayed asbestos is proceeding. The use of uncomfortable and sometimes cumbersome overalls and air hoods has slightly slowed down the rate of work. It is to the credit of both the management and men that these measures have been proved to be possible, but I think that it is highly desirable that we should attempt to more clearly define the risks, so that we can employ more appropriate preventive methods.

A medical Research Unit working closely with the Pneumoconiosis Research Unit at Penarth has been set up in Devonport Dockyard to attempt to define some of the risks more clearly. Work is proceeding on a detailed study of 420 men with varying asbestos exposure. Mortality studies of asbestos workers and other dockyard employees is under way, and a dust sampling programme is being carried out to give some idea of the dust exposure of most of the procedures producing asbestos dust in the dockyards.

Questions to be Answered

Asbestos is a very useful material and for some purposes it is irreplaceable in the shipbuilding in-

dustry, but in order that we can continue to use it safely we must know the answers to many questions. The solution to these problems will only be found after close co-operation between marine engineers and constructors, physicians, industrial hygienists, the Asbestos industry, management and men.

Engineers and constructors must be asked why asbestos is specified in their ships, and whether or not an alternative material would perform as well, more safely and as cheaply.

Management must be asked to plan the work of building or refitting a ship so that the minimum number of men is exposed to asbestos.

Men must be asked to treat with respect a material which can be dangerous when handled carelessly.

Physicians probably have to answer more difficult questions.

1. What exposure in terms of dust concentration and duration is required to set in motion the disease process manifesting itself as asbestosis? Is it still necessary to envisage long continuous exposure before we think that pulmonary fibrosis may be due to asbestosis, or is a short exposure sufficient given enough time for the disease to develop? The latter has already been suggested by McVittie (1965) and Gold and Cuthbert (1966). Is this an argument against the suggestion that ladders should only be employed as such for limited periods of time?

2. What are the criteria for making an early diagnosis of asbestosis? If we are to achieve anything useful from periodical medical examinations then surely at the first indication of impending asbestosis exposure to asbestos should cease? Hunt (1965) has suggested that men removed from further exposure to asbestos as the result of finding early impairment of lung function at routine examination have not shown further deterioration.

At present to advise a ladder to seek alternative employment because he shows early signs of impaired lung function, and before he is considered compensatable by the Pneumoconiosis Panel means a serious financial loss for the man. This is a very real dilemma. If we wait until the diagnosis is

certain the disease may progress fairly rapidly and soon become "compensatable." If on the other hand he is removed from exposure at an early stage he may not show further deterioration, or may do so at such a slow rate that we may never be certain of the accuracy of the diagnosis. Surely this must be our aim, to reduce to the minimum the number of cases of proven, compensatable asbestosis. Enlightened management and unions must seek ways to retrain and re-employ these men without financial loss and at no further risk to their health.

3. Is it safe to use crocidolite in any amount where air borne dust is produced? The experiences in our dockyards over the next two decades may partly help to answer this question.

Occupational hygienists together with physicists and ventilation engineers will have to help in answering these questions and the further problems arising from them.

1. We want to know the most suitable method for sampling asbestos dust?

2. What standards are we to aim at in dust control?

3. What are the best methods of dust control for our industry?

We want to know what dust levels are produced by the different processes and what protective measures must be taken by the men doing the work. Is it justifiable to allow other men to work without respiratory protection in a boiler room where lagging is being applied? How long after lagging or stripping has finished do we have to wait before it is safe for other work to proceed without respiratory protection? Are there suitable, effective, portable dust extraction units for use in ships?

The Asbestos Industry is undertaking intensive research into most of these problems. Can the industry produce insulating material which does not emit asbestos dust?

I have told you what we are doing to face up to the problems as we see them in the light of present knowledge, and I have put to you some of the questions we want answered. Can you help us?

EVOLUTION OF CONCEPTS CONCERNING ETIOLOGY AND PATHOGENESIS OF CANCER

*E. Cuyler Hammond, MD, New York City, Industr Med Surg
37(8):616-620, August 1968.*

This discussion is oriented to the gradual evolution of concepts concerning etiology and pathogenesis of cancer, and its implications in respect to the prevention of cancer and perhaps other diseases; how these ideas have evolved, what they may mean in the very near future and what they probably will mean in the more distant future.

For a generation now it has been very apparent that the only hope of curing cancer by present methods of therapy lies in early detection and diagnosis so that the tumor may be eradicated before it has become widespread in the body. Starting in the 1920's, through the American College of Surgeons and the American Cancer Society, great efforts were made to teach the public the so-called danger signals of cancer, such as cough, abnormal bleeding from any body opening, change in size and color of a wart or mole, etc. At the same time, the public was urged to get annual physical examinations. The evidence strongly indicates that this approach was highly useful. The cancer cure rate was raised from practically nothing at all in the early 20's up to somewhere about 1 in 4 in the early 40's, to about 1 in 3 at the present time. And perhaps it can be raised a little bit more. The idea of the cancer danger signals was a very simple one. It was thought that these danger signals were produced by cancer: A cancer can bleed, a lung cancer can cause coughing, etc. The public was told that if you have a cough, it may mean lung cancer, and to go to your doctor and see whether or not it is present. If you were lucky, it would not be there. If you were not quite so lucky, it would be there but it would be detected early. But I remember some twenty years ago when I first came with the Cancer Society, we had a number of conferences on this subject. Each time we spoke to a specialist in a particular field of cancer, the specialist raised some doubt about the danger signal related to the particular form of cancer. I remember very well that Dr. Alton Ochsner, who I'm sure most of you know, and Dr. Evarts Graham, both highly questioned the idea that we should tell people that a cough is a danger signal of cancer. I remember Dr. Ochsner said a cough can, of course, be caused by cancer, but if lung cancer had progressed to a point where it produced a cough, one no longer had an early lung cancer, but an

incurable lung cancer. This would also be true of a number of other danger signals.

It struck me that there were two things rather interesting here. The reasoning of Ochsner, Graham and others was obviously correct. It could hardly be denied. By the time advanced cancer was present with great bleeding, etc., it seldom could be cured. On the other hand, patients coming to doctors with these symptoms had resulted in the detection of many more early cancers, and had raised the cancer cure rate accordingly. At the same time a great many animal studies were being made on carcinogenic agents. These studies have shown: (1) When an agent that can cause cancer is applied, it takes a very long period of continuous exposure relative to the life span of the species before cancer occurs. This is not true for a few agents such as asbestos, but most often it requires continuous exposure of tissue. (2) Virtually everything we know which can cause cancer causes damage to the tissue. In some cases it causes symptoms and in some cases causes other changes which can be detected by a doctor. These changes may have nothing whatever to do with symptoms produced by cancer, but nevertheless to the extent that they are caused by things which can cause cancer they are warning signals of cancer. The patient has a condition which may lead to cancer later.

We know of a number of other factors which will produce lung cancer. One of these is industrial exposure to asbestos dust. It was recently reported that 100 percent of asbestos workers who die of lung cancer have pleural calcification, because this is something which is produced by asbestos exposure before the development of lung cancer. The two processes run concurrently. Sometimes a patient will die of one and sometimes of the other because of the rate of progression is not always the same.

On the questionnaire for our one million person study, we asked about different types of vague conditions. One of the vaguest of all was the tendency to fatigue easily. This condition among people who otherwise appeared to be well is highly associated with a later occurrence of cancer and many other diseases. Apparently it is a warning to the body that something is wrong somewhere. It is in no way

diagnostic, of course. At the present time, we are starting a multivariate type of analysis, studying combinations of complaints, past history of disease and other factors reported by people at the time the subject appears to be essentially well, at least not hospitalized nor acutely ill. From our preliminary analysis, it appears that we can make a very high prediction which people are likely to develop serious illness, not only cancer but other illnesses as well, within the next six months and up to five or six years. From a practical standpoint these findings can be utilized to identify those people who are most in need of seeing the doctor.

Although there are some agents which alone are powerful enough to produce cancer in experimental animals and perhaps in man, such as very heavy and prolonged exposure to uranium and radon gas, it seems to me very unlikely that most cancers in humans result from extremely high exposure to individual agents. Even though you might think of cigarette smoke as a carcinogenic agent, it is actually a conglomeration of a great many factors. From animal experiments we know of many instances in which two factors, a carcinogenic agent and a co-carcinogenic agent, acting together result in an enormously higher cancer rate than either one alone. Recently, Dr. Marvin Kushner, Pathologist at New York University Medical School, reported that he had finally produced lung cancer in rats by inhalation. This is something very difficult to do. When methyl-ocholanthrene alone was applied and the rats inhaled it in enormous quantities, he got one or two cancers. He also tried sulphur dioxide which is not considered to be a carcinogenic agent. Although in heavy dosage, it killed the animals, no cancer occurred. But when he exposed the rats to a mixture of these two agents, lung cancer has developed so far in 50% of his animals and may eventually develop in all of them.

In a study of asbestos exposure which I am carrying out with Dr. Irving Selikoff, among insulation workers, there is a suggestion that the asbestos exposure itself may cause pleural mesothelioma. But the main effect is exposure to asbestos in combination with cigarette smoking. In a group of several hundred workers we found the lung cancer death rate among them was about 90 times as great as the lung cancer death rate of people who neither smoke nor are exposed to asbestos. We had a number of non-smokers who were heavily exposed to asbestos, but so far none of them has developed lung cancer. What appears to occur, although this is not abso-

lutely proven yet, is that asbestos acts as a co-factor with smoking.

There are some things in our environment which we cannot control from a practical standpoint. There are others which we probably can control. If cancer is produced by a combination of factors and controlling any one of them will reduce the risk of cancer, then we obviously have much more hope of preventing the disease than if we had to control factors that are almost impossible to control.

"KP" DERMATITIS

CAPT Norman Goldstein, MC USAR, J Occup Med 10(8):423-425, Aug 1968.

"Dishpan hands" or housewives' eczema is a common complaint of many women and some men. This diagnosis has frequently helped convince a husband that his wife must have an automatic dishwasher. Bartenders, professional dishwashers, waitresses and surgeons also suffer from this frequently incapacitating, eczematous dermatitis.

Normal, healthy skin tolerates the regular use of correctly formulated soaps and detergents. Strong detergents intended for commercial dishwashing machines, however, may cause a severe contact dermatitis if improperly used. Dermatitis from mild soaps frequently occurs in atopic or ichthyotic individuals.

The subjects in this report developed an unusual dermatitis, an extreme form of "dishpan hands."

Report of Cases

The subjects, all healthy males, 18 to 21 years old, were recent inductees into the U.S. Army. Each of the 27 men noted a "rash" on his hands after "KP" (kitchen police) duty. None had a history of atopic dermatitis, ichthyosis (dry skin), or previous eczematous dermatitis of the hands.

In each case, the hands were immersed in hot water, a very strong detergent used, and protective gloves not worn. The duration of immersion ranged from 4 to 8 hours. Redness and varying degrees of "burning" during "KP" were noted and continued for many hours. Vesicles developed ten to 12 hours later on the dorsal, lateral and medial surfaces of the fingers. Six patients had vesicles on the dorsum of the hands, but none above the wrists. Many vesicles coalesced to form giant bullae, some up to an inch in diameter. Three men demonstrated subungual purpura in addition to vesicles and bullae. The purpura was asymptomatic. Irregularities in the surface of the nail did not develop.

Treatment was not required for the nails, but eight patients required hospitalization in order to care for the giant blisters. After incision and drainage of the bullae, cool Burow's solution compresses afforded symptomatic relief. Oral antihistaminics and topical corticosteroids were also prescribed. Mild secondary infection developed in several ambulatory patients.

Comment

The detergent used was a machine dishwashing compound (Dishwashing Compound Type I, composed of Sodium Metasilicate, Sodium Tripolyphosphate and Sodium Carbonate), not recommended for manual operations unless rubber gloves are worn. The pH of this compound (11.35) is far more alkaline than the usual household soaps and detergents. Many other men used this compound for shorter periods of hot water immersion, but failed to develop bullae or subungual purpura. An attempt was made to determine the total number of inductees who used this dishwashing compound without protective gloves. "Several hundred" men

were involved, but information concerning the use of gloves was not obtained.

After observation of the improper use of this machine dishwashing compound, frequent rotation of assignments and the use of protective rubber gloves prevented further cases of "KP" dermatitis.

Eight volunteers (physicians and their wives) were later asked to use this detergent in their kitchens at home for one week. They were requested not to use rubber gloves. Two women noted "burning sensations" but none of the volunteers developed erythema, vesicles or subungual purpura. Apparently the short, intermittent use of this strong detergent is not very harmful to hands.

This severe bullous dermatitis undoubtedly is a primary irritant contact dermatitis from the alkaline cleanser, made worse by prolonged immersion in very hot water. Though a history of different "KP" duty could not be elicited in the three men who developed subungual purpura, it is postulated that they received more severe trauma to their fingers than did the other men.

J. H. Mihan assisted in the epidemiological investigation.

EDITOR'S SECTION

BENEFICIAL SUGGESTION—A NEW DEVICE FOR KNEE ARTHROGRAMS

*LCDR William L. Pogue, MC USNR and
Jack Noel, HM1, X-ray Technician, USN.**

Arthrography of the knee has become a well-accepted aid to the evaluation of certain knee problems. Approximately 600 knee arthrograms were done in our military hospital last year, and we schedule nine a week. Arthrograms customarily have been done on a head unit, using the technique of Lindbloom¹, and require the production of 16 or 17 films, three slightly differently angled views in each of four projections (AP, inversion, eversion, PA with the knee bent 35 degrees), and three lateral

views. AP and lateral preliminary films are also necessary. In interpretation, it is important to have the three differently angled exposures of each projection adjacent to each other, for superimposed recesses can be seen to move with relationship to the meniscal outline, where as a meniscal tear maintains a constant relationship to the meniscus.

For these reasons, and because we did not have a head unit in our immediate working area, we devised a film holder** which made it possible for us to do arthrograms on any table, and to expose the three differently angled exposures of each projection on the same eight- by ten-inch film. This reduces the number of films, and therefore film expense, by one-half. It also makes handling of the films by the radiologist far easier since it is unnecessary to arrange the films into groups of three. Having all three of the differently angled views of the same projection on the same film makes it easier to appreciate whether a contrast line is normal recess or meniscal tear. Another advantage is that the tech-

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The opinions or assertions contained in the article are the private ones of the authors and are not to be construed as official or reflecting the views of the Navy Department or of the Naval Service at large.

** The device is available from:
Special Surgical Instruments Company
P.O. Box 3231-FH
El Cajon, California 92020

nician does not have to change a film after each of the fifteen exposures and carry it to a protected area; he only has to change every third film, excepting the lateral exposures.

The film holder is sturdy and made of aluminum with a 2-mm lead overlay to protect the non-exposed part of the film. The illustration shows the position of the holder for the PA or "notch" view. The aluminum side plates place the holder at 35 degrees to the horizontal. With the patient on his stomach, the knee is flexed 35 degrees for the PA views in order that the popliteus recess is moved off of the lateral meniscus. This is necessary, since in the AP view, with the knee fully extended, the popliteus recess is projected directly over the lateral meniscus in the majority of instances and may therefore pose a diagnostic problem.

For the AP, inversion, and eversion views, the holder is placed face down and with the side plates extending directly up in the air. The other side has an identically placed "window" or cutout. The window of each side is 5 by 3.25 inches and is used for all exposures except the three lateral views, which are exposed on an individual eight- by ten-inch cassette. The holder has two spring-operated locking bars which are quite sturdy. With a touch of a finger the locking bar of each position swings out of the way, allowing the film to be manually advanced precisely to the adjacent and previously unexposed 3.25-inch area of film cassette, the new angle of the tube is obtained, and the exposure is made. The film can be labelled with numbers and date by placing small radiographic lead characters on tape and placing the tape over the edge of the window. A cellotex tape is mounted on either side of the holder so that, when the PA views are exposed with the knee flexed 35 degrees, the calf is firmly held so that the knee does not slip. Finally, a film cassette can be inserted into or removed from either the end or either side of the film holder.

We no longer wrap the knee after injection of the knee joint space, since when the knee is extended almost all joint fluid is forced into the suprapatellar pouch. I have interpreted the last fifty arthrograms without the knee having been wrapped and find that there is no noticeable difference. The time saved by the above-listed modifications of the Lindbloom method allows us to finish an arthrogram within five minutes after the needle has been removed from the joint. This and a three-minute film processor make it possible to obtain repeat films, when necessary, with almost no unsharpness due to dilution of con-

trast by the production of synovial fluid, or to absorption of contrast.

Acknowledgment to Gordon B. Lowell.

Reference

1. Lindbloom, K.: Arthrography of the knee. A roentgenographic and anatomical study. *Acta Radiol, Supplementum* 74, 1948.

NSHA CHANGE OF COMMAND

Colorful military ceremonies marked the change of command on September 26th at the Naval School of Hospital Administration (NSHA), National Naval Medical Center in Bethesda, Maryland. CAPT Robert M. Tennille, Jr., MSC USN, became the school's 10th commanding officer as he relieved CAPT Emmett VanLandingham, Jr., who has been appointed Chief of the Navy Medical Service Corps.

CAPT Tennille takes the helm of the 23-year-old naval school which annually graduates 36 officer specialists from a rigorous course in hospital administration and offers newly-commissioned officers of the Medical Service Corps orientation and indoctrination courses. The school is an affiliate of The George Washington University.

A native of Alton, Florida, CAPT Tennille enlisted in the Navy as an apprentice seaman in 1935, and served in all enlisted grades prior to accepting a commission in 1944. He has served aboard the ammunition ships USS NITRO and USS PYRO; the carrier USS LEXINGTON; and the hospital ship USS REFUGE. He has been stationed at naval dispensaries in Norfolk, Va., and Washington, D.C.; at the hospitals in Philadelphia, Pa., Quantico, Va., Washington, D.C., Camp Lejeune, N.C., and at Rodman and Coco Solo in the Panama Canal Zone. Prior to assuming command at NSHA, he was the Director of the Hospital Administration Division, Bureau of Medicine and Surgery.

CAPT Tennille was awarded a Master of Business Administration degree in 1955 from the Harvard University School of Business. He was promoted to his present rank in November 1966.

His service medals include three awards of the Navy Good Conduct Medal; American Defense (base clasp); American Campaign; Asiatic-Pacific Campaign; World War II Victory Medal; Navy Occupation Medal; and two awards of the National Defense Service Medal.

CAPT Tennille is married to the former Miss Ellen Thomas of Owens, Virginia. They have three sons: Robert, 25; Thomas, 20; and David, 16.—Public Affairs Office, BuMed.

AWARDS AND HONORS

Navy Cross

Taft, David A., LCDR MC USN

Silver Star

Groshong, Allen E., HM3 USN
Keller, Allen N., HM1, USN
Schindeler, Theodoor K., HN USN

Legion of Merit (2nd Award)

Duffner, Gerald J., CAPT MC USN

Bronze Star

Benson, Harry T., HM3 USN
Long, Clark H., HM2 USN
O'Connell, Anthony P., HM3 USN
Stark, Stephen W., HM3 USN
Stokes, Donny M., HN USN

Navy Commendation Medal

Arnold, Leroy E., LT(JG) MSC USN
Bowe, Warren G., LCDR MSC USN
Brouillette, Marie Joan E., LCDR NC USN
Camp, John A., HMC USN
Clay, Archie G., HMC USN
Cooley, Gary G., LT DC USNR
Crosson, Robert C., LCDR MC USN
Effner, Dorothy J., LCDR NC USN
Gardill, Norma H., CDR NC USN
Gorman, Walter J., CDR DC USN

Navy Achievement Medal

German, Kenneth D., LT MC USNR
Mertz, Richard C., LT MC USNR
Snidow, Conley T., III, LT DC USNR

Joint Service Commendation Medal

Erwin, Richard E., LCDR USN

Certificate of Commendation

Branch, Hilas F., HM1 USN
Herrington, Daisy J., LCDR NC USN

Letter of Commendation

Bechthold, Duane A., HM1 USN
Chopyak, John A., LCDR MC USNR
Cooley, Gary G., LT DC USNR
Gorman, Walter J., CDR DC USN
Horton, Paul F., SN USN
Kolar, Dean J., LT DC USNR
Malczewski, Thomas M., SN USN
Mathis, Daniel W., DT2 USN
McMurray, Robert C., HM1 USN
Mulvaney, Paul G., DTC USNFR
O'Cain, Dennis P., DN USN
Pasaraba, Placido P., TN USN
Raper, Donald E., DT1 USN
Seibert, John F., DT2 USN
Sharron, James D., DT3 USNR
Vaughn, Robert L., HM1 USN
Wade, Harold R., DT3 USN
Whisler, Thomas J., DT3 USN

Letter of Appreciation

Conway, Lorraine, LT NC USNR
Cronin, Claire M., LT NC USNR
Fowlkes, Ronald S., HM3 USN
Hazzard, Charles A., HM1 USN
Holthouser, Lawrence E., HM2 USN
Hyatt, Edwin H., HM3 USN
Markowitz, H. A., CAPT MC USN
Ostroski, John S., HM2 USN
Robinson, D. W., CAPT MC USN
Thomas, Donald L., HM2 USN
Versteeg, Donna M., HN USN
Weissman, Edward, HM2 USN

Certificate of Merit

Snowden, William M., CAPT MC USN

Vietnamese Gallantry Cross

Jenkins, Elmer E., LT MSC USN

Vietnamese Staff Service Honor Medal

Bowe, Warren G., LCDR MSC USN

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